THE

AMERICAN NATURALIST

AN ILLUSTRATED MAGAZINE

OF

NATURAL HISTORY

EDITED

BY A. S. PACKARD, JR.

ASSOCIATE EDITORS

PROF. G. L. GOODALE, DEPARTMENT OF BOTANY

DR. R. H. WARD, DEPARTMENT OF MICROSCOPY

VOLUME X

BOSTON

H. O. HOUGHTON AND COMPANY

CORNER BEACON AND SOMERSET STREETS

NEW YORK: HURD AND HOUGHTON

The Riverside Press, Cambridge

1876

35

QH1.
.A5
v.10

506.73
A2

Copyright, 1876,
By A. S. PACKARD, Jr.

The Riverside Press, Cambridge:
PRINTED BY H. O. HOUGHTON AND COMPANY

CONTENTS.

		PAGE
American Antelope, or Prong Buck, The	*J. D. Caton*	193
American Zoölogy, A Century's Progress in	*A. S. Packard, Jr.*	591
Ancient Ruins in Southwestern Colorado		31
Ancient Sceptre, An	*C. C. Abbott*	673
Animal Humor	*Samuel Lockwood*	257
Antiquity of the Indians of North America, Indications of the, derived from a Study of their Relics	*C. C. Abbott*	65
Aquaria: their Past, Present, and Future	*William Alford Lloyd*	611
Are Potato Bugs Poisonous?	*Aug. R. Grote* and *Adolph Kayser*	205
Are we drying up?	*J. D. Whitney*	513
Autochthon, Traces of an American	*C. C. Abbott*	329
Bartramian Names in Ornithology, The Availability of certain	*J. A. Allen*	12
Bastian and Pasteur on Spontaneous Generation	*Henry J. Slack*	730
Bees and Ants, Lubbock's Observations on		148
Black Knot, The	*W. G. Farlow*	341
Botany, University Instruction in	*W. G. Farlow*	287
Burs in the Borage Family	*Asa Gray*	1
California Garden Birds	*J. G. Cooper*	90
Carnivorous Plants	*W. J. Beal*	588
Cave Beetles of Kentucky, The	*A. S. Packard, Jr.*	282
Chirp of the Mole Cricket, The	*Samuel H. Scudder*	97
Colony of Butterflies, A	*Aug. R. Grote*	129
Colorado, Explorations in, under Professor Hayden in 1875		161
Cooper's Helix in Colorado	*E. A. Barber*	529
Cosmopolitan Butterfly, A	*Samuel H. Scudder*	392, 602
Deer, A New Californian	*J. D. Caton*	464
Destruction of Birds by Telegraph Wire, The	*Elliott Coues*	734
Evolution, The Progress of Discovery of the Laws of	*E. D. Cope*	218
Exploration of a Mound in Utah	*E. Palmer*	410
Florida Chameleon, The	*S. Lockwood*	4
Flounders, The Development of	*Alexander Agassiz*	705
Former Range of some New England Carnivorous Mammals, The	*J. A. Allen*	708
Game Falcons of New England, The: The Goshawk	*W. Wood*	132
Germs, Professor Tyndall on		347
Gooseberries, Our Wild	*Asa Gray*	270
Guadalupe Island, Lower California, The Flora of	*Sereno Watson*	221
Haeckel's Gastræa Theory	*Alexander Agassiz*	73
Harvard Summer School of Geology, The	*N. S. Shaler*	29
House Fly, The	*A. S. Packard, Jr.*	476
House Plants, Hygiene of	*George H. Perkins*	667
Io and its Habits	*James Lewis*	321
Johnny Darters	*D. S. Jordan* and *H. E. Copeland*	335
Jumping Seeds and Galls	*C. V. Riley*	216
Kerguelen Island, The Natural History of		481
Lake Wakatipu, New Zealand	*H. C. Russell*	385
Little Missouri "Bad Lands"	*J. A. Allen*	207
Lobster, The: Its Structure and History	*J. S. Kingsley*	396
Microscopes at the Loan Collection of Scientific Apparatus of the South Kensington Museum	*John Nichols*	532

Microscopy at the International Exhibition. ..... *R. H. Ward*. 725
Mimicry in Butterflies explained by Natural Selection.... *F. Müller*. 534
Missing Link between the Vertebrates and the Invertebrates, The. ..... *G. T. Brettany*. 598
Mode in which Cockroaches and Earwigs fold their Wings, The ..... *Samuel H. Scudder*. 521
Multiplication by Fission in Stentor Mülleri..... *J. D. Cox*. 275
Museums, The History of the Origin and Development of.. *H. A. Hagen*. 80, 135
Naturalist, A Neglected. ..... *H. E. Copeland*. 469
New Zealand Flax..... *J. C. Russell*. 18
Ornithology in the United States during the Last Century, Progress of. ..... *J. A. Allen*. 536
Phyllotaxis, A Popular Explanation (for those who understand Botany) of the Mathematical Nature of. ..... *Chauncy Wright*. 326
Polar Regions, On the Former Climate of the..... *A. E. Nordenskiöld*. 352
Pottery, The Ancient, of Colorado, Utah, Arizona, and New Mexico. ..... *Edwin A. Barber*. 449
Plain, Prairie, and Forest..... *J. D. Whitney*. 577, 656
Primitive Man..... *J. Wyman*. 278
Remarkable Life History and its Meaning, A..... *W. K. Brooks* 641
Reply to Mr. J. A. Allen's "Availability of certain Bartramian Names in Ornithology"..... *Elliott Coues*. 98
Rock Inscriptions of the "Ancient Pueblos" of Colorado, Utah, New Mexico, and Arizona..... *Edwin A. Barber* 716
Song Sparrow, The Proper Specific Name of the..... *David Scott*. 17
Spontaneous Generation, Professor Tyndall's Experiments on, and Dr. Bastian's Position..... ..... *W. H. Dallinger*. 415
Summer Birds of the White Mountain Region, The..... *H. D. Minot*. 75
White Ants, The Probable Danger from..... *H. A. Hagen*. 401
White Egrets, The Occurrence of, at Trenton, New Jersey .. *C. C. Abbott*. 473

RECENT LITERATURE.

A Few Suggestions on Tree-Planting, 295; Anderson's Mandalay to Momien, 361; Anderson's Norse Mythology, 229; Appalachia, 622; Archives of the National Museum of Brazil, 623; Baird's Annual Record of Science for 1875, 423; Botanischer Jahresbericht, 296; Brinton's Myths of the New World, 365; Caton's Summer in Norway, 39; Cook's Manual of the Apiary, 621; Cope's Check-List of North American Batrachians and Reptiles, 105; Darwin's Movements and Habits of Climbing Plants, 171; Davies' Preparation and Mounting of Microscopic Objects, 739; Dichogamy in Plants, 42; Die Pflanzenwelt Norwegens, 295; Edwards's Butterflies of North America, 108; Fritsch's Birds of Europe, 485; Hassard's Floral Decorations, 298; Hayden's Report on the Geology of Colorado, 423; Hentz's Spiders of the United States, 170; Huxley and Martin's Biology, 228, 739; Johnson's Cyclopædia, 362; Jordan's Manual of the Vertebrates of the Northern United States, 739; Kidder's Natural History of Kerguelen Island, 105; Kneeland's American in Iceland, 296; Manton's Taxidermy, 623; Marschall's Nomenclator Zoölogicus, 169; Morse's First Book of Zoölogy, 170; Orton's Andes and the Amazon, 682; Orton's Comparative Zoölogy, 550; Pickering's Elements of Physical Manipulation, 422; Powell's Exploration of the Colorado, 102, 736; Quarterly Bulletin of the Nuttall Ornithological Club, 425; Recent Books and Pamphlets, 43, 109, 171, 230, 298, 366, 425, 487, 551, 623, 683, 740; Recent Contributions to North American Mammalogy, 362; Recent Memoirs of North American Mammals, 423; Riley's Eighth Report on the Noxious Insects of Missouri, 485; Sach's History of Botany, 107; Sach's Text-Book of Botany, 37; Scudder's Fossil Butterflies, 106; The Geological Record for 1874, 362; The Octopus, 108; The Zoölogical Record, 106; The Zoölogical Record for 1874, 486; Two Years in California, 621; Wheeler's Geology of the United States west of the One Hundredth Meridian, 622; White's Natural History of Selborne, 229; Wilson's Prehistoric Man, 682; Wyman's Fresh-Water Shell-Mounds of the St. John's River, Florida, 165.

GENERAL NOTES.

Botany.—Æstivation of the Fuchsia, 110; Alfred W. Bennett on the Growth of the Flower-Stalk of the Hyacinth, 683; Alpine Plants of the White Mountains, 745; Anthers in Trillium, 427; Aplectrum with Coral-like Root, 370; Arbeiten des Botanischen Institut in Würzburg, 301; Arrested Growth and Persistence of Barbula ruralis, 366; Astragalus Robbinsii Gray, 172; Botanical Papers in Recent Periodicals, 46, 113, 174, 235, 300, 371, 428, 492, 555, 625, 687, 745; Botanical Prizes, 174; Botany of California, Vol. I., 624; Calluna vulgaris, the Ling or Heather, rediscovered in Massachusetts, 489; Chellanthes Alabamensis, 44; Dichogamy in Epilobium angustifolium, 43; Dimorphism in Claytonia, 44; Eccentricity of the Pith of Rhus toxicodendron, 232; Exotic Plants around San Francisco Bay, 110; Fungi heaped up in Pines by Squirrels, 112; Heteromorphism in Epigæa, 490; Influence of Light and Heat on Transpiration in Plants, 623;

Influence of Temperature on the Germination of Pine-Seeds, 624; Insectivorous Plants, 111; Large Elm, 489; New Classification of Cryptogams, 173; Notes on Acnida, 487; Notes on Alpine and Subalpine Plants in Vermont, 731; On the Hygroscopic Mechanism by which certain Seeds are enabled to bury themselves in the Ground, 367; On the Rate of Movement of Water in Plants, 299; Origin of High Hydrostatic Pressure in Vegetable Cells, 45; Preissia commutata, 110; Rate of Growth of Agave Scapes, 300; Researches in regard to Growth, 370; Rhynchospora capillacea var. leviseta, 370; Schœnolirion Torr., 426; Schœnolirion, Appendix, 552; Sets of Named Fungi, 174; Sedum reflexum L., 553; Sequoia sempervirens, 110; Spores of Blodgettia confervoides, 428; The Hollyhock Puccinia, 44; The Influence of Light on the Color of Flowers, 299; The Life-History of Moulds, 112; The Nutrition of Plants, 744; The Plantain indigenous in Southern Colorado, 230; The Potato-Blight, 172; The Primordial Utricle, 45; The Relative Fertility of Cross-Fertilization and Self-Fertilization, 744; The Teeth of Green Leaves as Organs for the Secretion of Nectar, 300; The Two Bitter-Sweets, 743; The Wild Flowers of North America, 113; Tolmiæa Menziesii, 300; Tropical Trees during the Dry Season, 231; "Twines with the Sun," 174; Vallisneria spiralis, 110; Vitality of Seeds, 230.

Zoölogy. — A Gorilla in England, 627; A Snake-Eating Snake, 178; A Spider Fisherman, 688; A True "Snake Story," 493; Another Case of Animal Commensalism, 429; Are Potato Beetles Poisonous? 303; Bartramian Names again, An Explanation, 176; Bears and Panthers on the Pacific Coast, 177; Bewick's Wren, 47, 237; Breeding Range of the Snow-Bird, 114; Corals and Coral Islands, by James D. Dana, 373; Early Nesting of the Anna Humming-Bird, 48; Egg of Chionis, 628; Eggs of Boa-Constrictor, 239; Eyes and No Eyes, 178; Flowers of the Golden Currant perforated by Humblebees, 238; Geographical Variation among North American Mammals especially in respect to Size, 625; Habits of the White-Footed Mouse, 555; Habits of Western Birds, 238; Homologies of Mammalian Teeth, 115; Intelligence in the Hawk Moth, 50; Mayer's Ontogeny and Phylogeny of Insects, 688; New Shells from Colorado, 745; Notable Change of Habit of the Bank Swallow, 372; Note on the Blue Goose, 374; Occurrence of Maggots in a Boy, 374; Pelicans in San Francisco Bay, 177; Perforation of Orange Skins by Moths, 50; Protective Resemblance in the Yellow-Bird, 115; Range of the Bay Ibis, 48; Remarkable Habits of a Tree-Frog, 178; Remarkable Structure of Young Fishes, 239; Sensitiveness to Sound in the Shrew, 430; Shells of Kerguelen Island, 116; Small Birds caught by the Burdock, 239; Swedish Podurans, 375; "The Bank Swallow" again, 493; The Bluebird feeding on Ampelopsis, 556; The Chapparal Cock, 373; The Cotton Worm, 303; The Crossbill breeding at Riverdale, N. Y., 237; The Extinction of the Great Auk at the Funk Islands, 48; The European Tree Sparrow in the United States, 50; The European Woodcock shot in Virginia, 372; The Green Snake in New Mexico, 494; The Labrador Duck, 303; The Little White Egret in Colorado, 430; The Nature of Monads, 688; The Pilot Fish, 687; The Sea-Lions, 177; The "Sisco of Lake Tippecanoe," 373; Unusual Nesting Sites of the Night Hawk and Towhee Bunting, 239.

Anthropology. — Aboriginal (?) Gun-Flints, 691; American Archæology, 181; An African Potter at her Work, 629; An Indian Rock-Shelter in Lancaster County, Pennsylvania, 241; An Interesting "Find" of Indian Relics, 375; Anthropological News, 377, 433, 496, 556, 692, 748; Anthropological Notes, 179, 240, 304; Antiquity of Man, 51; Indian Graves in New Jersey, 52; Jasper War-Club Teeth, 116; Notes on the Stone Implements from Arkansas, at the Philadelphia Exhibition, 494; Occurrence of the Patoo-Patoo in North America, 558; Opening of a Royal Burial Mound in Denmark, 117; Stone Implements from Ohio at the Philadelphia Exhibition, 495; The Tasmanians, 242; Were the Oldest American People Eskimos? 432; Western-worked Flakes, and New Jersey Rude Implements, 431.

Geology and Palæontology. — A Carnivorous Reptile about the Size of a Lion, 560; A Fossil Sirenian Animal in Jamaica, 117; A Fossil Skunk from the Bone Caves of Pennsylvania, 499; Comstock's Geology of Wyoming, 52; Cope's Cretaceous Vertebrates, 53; Cretaceous Vertebrates of the Upper Missouri, 750; Explorations by Wheeler's Survey, 498; Extinct Coral Reef at Bahia, 499; Fossil Vertebrates of New Mexico, 54; Geological Survey of Canada, 560; Geology of New Caledonia, 118; Gigantic Mammals of the Rocky Mountains, 305; Hot Springs and Geysers, 242; Hyatt's Fossil Ammonites, 53; Icebergs off the Coast of Newfoundland, 559; Ice-Marks in Newfoundland, 694; Kerr's Geology of North Carolina, 53; Meek's Invertebrate Fossils of the Upper Missouri, 499; More Fossil Birds, 561; Mountain-making, 192; Palæontology and the Doctrine of Descent, 694; Powell's Geology of the Uinta Mountains, 751; Recent Discoveries of Extinct Animals by Professor Marsh, 436; Recent Views in Geology, 559; Scudder's Fossil Butterflies, 53; The Brain of the Dinoceras, 182; The Earliest Edentates, 117; The Fossil Plants of America, 53; The Mechanism of Stromboli, 245; The Mountains of New Zealand, 247; The Tæniodonta, a new Group of Eocene Mammals, 379; The Walrus formerly in South Carolina, 561; Winchell's Geology of the Black Hills, 53.

Geography and Exploration. — African Travel, 55; Ancient Geographers, 306; Arctic Stations, 56; Cameron's Discoveries in Africa, 441; Cameron's Explorations in Tropical Africa, 247; Circumnavigation of Lake Albert Nyanza, 562; Exploration in New Guinea, 502; Exploration of the Upper Madeira Plate, 183; Exploring Expeditions in Greenland, 629; Extracts from Stanley's Last Letters from Central Africa, 695; Inundation of the Sahara, 307; Is it possible to unite the

Black Sea and the Caspian? 306; Map of Prehistoric Ruins in Colorado, 307; Mexican Migrations, 120; Mount St. Elias, 124; News from Stanley, 561; Nordenskiöld's Arctic Expedition, 55; Peruvian Geography, 379; Pictures of Yünnan, 119; Recent Rise of the Peruvian Coast, 380; Resources of the Black Hills, 501; Return of the British Arctic Expedition, 751; Siberian Exploration, 501; The Aleutian Islands, 184; The Himalayas and their Glaciers, 55; The Isthmus of Tehuantepec, 500; The Kybale Race, 119; The New Route to China, 752; The Pacific Coast of America, 55; The Swedish Expedition to Novaya Zemlya, 119; The Tundras of Siberia, 118; United States Coast and Interoceanic Surveys, 118; Wheeler's Reconnaissance of Southern Nevada, 55.

Microscopy. — **A Compact Collecting Case, 503; A Double Staining with Hæmatoxylin and Aniline, 56; A New Fungus, 631; A Polariscope Object, 123; A Remarkable Forage for Bees. 122; Action of Poison on Blood, 443; Amateur Microscopes, 120; American Microscopical Societies, 309; American Postal Micro-Cabinet Club, 185; An Easy Nitzschia, 566; Animal and Vegetable Cellulose and Starch, 565; Aperture of an Objective, 442; Aperture of Objectives, 566; Arranged Pollens, 565; Arranging Diatoms, 502; Bliven's Photographs, 442; Blood Globules in Typhoid Fever, 122; Boston Microscopical Society, 381; Collecting Diatoms, 567; Comparative Photographs of Blood, 318; Cryptogamic Parasites, 122; Diatoms as Fertilizers, 754; Double-Stained Muscular Fibres, 630; Eccentric Pith of Climbing Plants, 58; Effect of Aperture on Definition, 565; Exchanges, 253, 308, 443, 754; James W. Queen & Co., 122; Kinne's Turn-Table, 308; Micro-Photographs in Histology, 753; Micro-Photography, 567; Microscopy, 503; Microscopy at the American Association, 630; Microscopy of the American Association, 184; Microscopical Examination of Crude Drugs, 565; Mode of Production of Microscopical Images, 252; New Adjustment for Cox's Turn-Table, 311; Oxalide of Asparagine, 443; Photographing the Nineteenth Band, 566; Photo-Micrography, 631; Polarization of Living Tissues, 502; Polarizing Crystallizations, 309; Popular Microscopy, 566; Practical Histology, 568; Raphides in Enchanter's Nightshade, 123; Recognition of Wool in Mixed Fabrics, 563; "Rusty Gold," 308; San Francisco Microscopical Society, 307; San Francisco Society, 442; Sonorous Sand, 253; The Leeuwenhoek Medal, 311; The Limits of Microscopic Vision, 380; The Richmond Fossil Earth, 753; Tyndall Association, 253; Use of Carbolic Acid in Mounting, 57; Van der Weyde's Oblique Illuminator, 752; Volatilized Gold, 754; Water Analysis, 567; Wythe's Amplifiers, 503; Wythe's Illuminator, 442.**

SCIENTIFIC NEWS, 58, 123, 186, 254, 312, 381, 444, 504, 568, 631, 699, 754.

PROCEEDINGS OF SOCIETIES, 60, 125, 188, 255, 315, 382, 445, 507, 570, 632, 703, 757.

SCIENTIFIC SERIALS, 63, 128, 192, 256, 319, 384, 448, 512, 576, 640, 703, 758.

THE

AMERICAN NATURALIST.

Vol. x. — JANUARY, 1876. — No. 1.

BURS IN THE BORAGE FAMILY.

BY PROFESSOR ASA GRAY.

A BUR in the light of morphological botany may be seen to be a seed, a fruit or a portion of one, a calyx, an involucre, or what not. Under the teleological aspect, which was once thought to be expelled from natural history, but which has come back in full force, a bur is one adaptation for the dissemination of seeds by cattle or other animals.

One of the most familiar burs is that of the common hound's-tongue (*Cynoglossum*), of the Borage family; and those of one or two species of stickseed (of the nearly related genus *Echinospermum*) are equally troublesome, clinging as they do to the fleece or hairy coat of domestic animals and to clothing. These burs, morphologically, are not seeds, but quarter portions of seed-like fruits. They adhere for transport by means of prickles or projecting points, which are either barbed or hooked at the tip; the grappling organs in some cases occupying the whole surface of the pericarp, in others particular portions of it.

It is rather interesting to notice how in the same family, that is, among plants all constructed on the same particular plan, this same purpose is effected or attempted in different ways, and, as we may say, more or less successfully. The occasion of these remarks came to me with a new plant of this order in which the bur proved to be formed of different materials from the ordinary burs of the family.

It is worth noticing, moreover, that in what botanists must consider one and the same genus, and, so to speak, of one blood, the grappling organs may be either more or less developed, or rudimentary, or even wanting altogether, or when wanting to the seed-like fruits, may be developed on some neighboring part.

Copyright, A. S. Packard, Jr. 1875.

The genus *Eritrichium* here offers instructive illustrations. It is very nearly related to the stickseeds. One end of its series of thirty or forty species is very near to *Myosotis*, or forget-me-not; the other, in all its characters other than that of the grappling fruit, comes very near to *Echinospermum*, or stickseed. Now, among species at both ends of the series — in some and not in others — a tendency to bur-like fruit is manifested. The four seed-like nutlets, either smooth or moderately and variously roughened, fall out of the calyx at maturity, and take their chance. But in a few of them, in one especially which is found upon our higher Rocky Mountains, a wing-like circle of prickly teeth is developed around the back, which calls to mind the similar grappling border of a common western stickseed, except that its rays are not barbed. Yet in a recent monograph of the American species it is said that "they bear a few rigid, bristly points; which only need to turn backward to be glochidiate," that is, to become grappling barbs. In another species, *E. Californicum*, the little nutlets usually have a merely wrinkled or roughened surface; but we have lately observed, in what we must regard as a form or state of it (var. *subglochidiatum*), that the crest of the rugosities rises here and there into short, bristly points, and the tips of some of these, under a lens, show minute but distinct backwardly turned barbs. Then, quite at the other end of the genus there is a species, *E. pterocaryum*, which has three of its four nutlets wing-margined, the wing essentially resembling that which, in the commoner stickseed of the same western region, often connects the rayed circle of barbs; and this wing is now and then found to be broken up into narrow lobes or teeth, which only need barbs to convert this outlying *Eritrichium* into an *Echinospermum*. The bearing of such facts upon the question of the origin of the efficient burs of stickseeds and the like is obvious.

But this same genus, *Eritrichium*, in some cases secures dispersion by cattle in another way. It is a common character of the Borage family to have the herbage and the calyx beset with stiff and sharp bristles, in some even pungent or stinging. In one set of species, nearly confined to our western plains and thence to California (the section *Krynitzkya*), the fruit-bearing calyx inclines to close loosely over the four small and smooth or unappendaged seed-like nutlets, at maturity a joint forms underneath, and the whole falls off together. In most of these the bristly hairs that clothe the calyx are particularly strong and sharp; and,

as they spread in all directions, the whole, if caught in the hairy coat of passing animals, is likely to act as a sort of four-seeded bur; the bur here being a fruiting calyx instead of a quarter-section of pericarp. The bristles being straight and smooth, their hold is precarious. We know of no species in which they become hooked. But just that occurs, on a small scale, in nearly half the species of the related genus *Myosotis*, mouse-ear or forget-me-not; that is, the stronger bristles on the calyx are neatly hooked at the tip, and so a sort of bur is formed. It would be more effective if the fruit-bearing calyx disarticulated more readily from its pedicel.

This brings us to the new genus already referred to. It is an insignificant little plant in appearance, recently found by Dr. Edward Palmer upon Guadalupe Island, off Lower California. The specimens were mixed with those of a *Pectocarya* (native to California and Chili), which in aspect they much resemble. But in *Pectocarya* the four-lobed and four-rayed fruit is itself a bur, grappling by a fringe of marginal bristles or slender teeth with hooked tips. But in our new plant, which I have named *Harpagonella*, the nutlets or seeming seeds are perfectly smooth. There is in the flower the ordinary provision for four of them; but two of the lobes on one side seem to be abortive from the first, while the other two grow to an unusual size, compared to that of the blossom. As they enlarge, so does the calyx on that side of the flower, but not on the other. The two conjoined calyx-leaves of that side, united by their contiguous edges almost to the tip, as they increase in size soon begin to fold around one or the other of the growing nutlets, — it seems indifferent which, — leaving the other one "out in the cold," forming a sort of husk which incloses it completely, and then develops from the outside five or six long and narrow finger-like processes, and along the length of these forms a set of hook-tipped bristles, thus producing a most effective bur.

As to the other seed, it apparently starts as fair as its preferred twin-companion, and sometimes it grows to almost the same size and matures its embryo, but more commonly it fails to mature.

This is a curious case of "natural selection," and a sacrificing of three for the greater advantage of one. For an advantage we must presume it to be, or to have been, to be thus protected and provided with means of transport; else, under any view, it would not have come to pass. Moreover, this is a sort of case which is comparatively intelligible under the supposition that it has come to pass in the course of time and the course of nature; while the

supposition of its specific creation in this way at the first, on the plan of destroying two of the four at the birth, and giving one of the remainder a diminished chance for existence, is an utterly bewildering conception.

I know not what quadrupeds or other animals there may be upon Guadalupe Island, of which this bur may have taken advantage for dissemination. I presume there are, or have been, such animals upon the island. But even if there are none, the hypothesis of the development of this bur under natural selection will not thereby be negatived. For although we know of this plant only there, we are not bound to suppose that it originated on this small island. The island is now used as a breeding-place for Angora goats. As they come to be distributed upon the adjacent main-land, we may expect that the little *Harpagonella* will take advantage of the offered means of transport, and compete with its relatives already established there.

THE FLORIDA CHAMELEON.

BY REV. S. LOCKWOOD, PH. D.

WITH the opening of summer, the teaching naturalist is sometimes delighted at finding on his lecture table a curious or attractive specimen from the local fauna or flora. Perhaps the object is the more interesting as being the contribution of some enthusiastic pupil. Sometimes it happens that the object has been, at some cost of trouble, obtained from a distance. In this way, early last June, a pleasant surprise was sprung upon the writer, who found on his table a box containing four small lizards from Florida. Poor little things, there were eight of them when they left the sunny South; for alas, four had perished from the roughness of "the middle passage." They had been unskillfully packed, or rather not packed at all; and the shaking they had experienced had been too much for them. That day another died, leaving but three. To get them home I had a ride of thirty miles by rail. Having put my little box safely in a corner of the car, between the coal-bin and the stove, I took a forward seat, and from the effects of late work the night before soon fell into a doze of a few minutes. I was awaked by the noise of the passengers. Happening to look on the floor of the car, I beheld, to my dismay, the youngest of my lizards under the seat immediately before me. It had got out of the box, and had crept under the

seats. With a singular aspect of quizzical timidity it was peering innocently at me out of its pretty, beaming eyes. Now these little things, so purely innocent, are in their movements as quick as light. Something must be done, and very soon, or I and my pet were both undone. If seen by one of these garrulous women, the resulting commotion will be of a sort to defy all sober imaginings, for the little innocent will loom up into the presence of a rattlesnake with four legs, seeking whom he may destroy. I stooped slowly and cautiously. How fortunate! I covered its escape with the first movement of my hand. How the tiny thing did squirm! I took it quietly back to the box, put its nose at the hole whence it had escaped, and so had it once more secure. All these tactics were gone through without attracting the notice of any one; and so, greatly relieved, I resumed my seat as if nothing had happened.

Soon a small fern case was improvised. The sides were glass, and for the sake of giving air, the top was covered with a piece of lace. The bottom was spread with Sphagnum, moderately moist. Into this were set some very small ferns, two species of Drosera or sundew, and in one corner a small specimen of Sarracenia, or pitcher-plant; this was so elegantly marked that it seemed like those antique carnelian cups which one reads about. Gracefully trailing over this mossy bed was the dark, bright-leaved Mitchella. To imitate a contiguous lake or pond, at one corner a shallow vessel of water was sunken in the moss. In this pretty garden our three pets were placed. The design was a mimicry of their own sub-tropical surroundings, with the hope of getting them to feel sufficiently at home to exhibit some of their peculiar traits.

As our little strangers are now snugly domiciled in their new home, some account may be attempted of their family relation and individual habits.

This little reptile is found as far north as South Carolina, hence it is known in the books as the green Carolina lizard. Visitors to Florida seem by almost common consent to have named it the Florida chameleon. While structurally there is in the reptile thus indicated a very wide difference from its namesake, yet there are relationships between them, one of which is notably suggested in the faculty of changing the color of the skin. Indeed, naturalists have regarded this little thing as the representative or analogue in the New World of the chameleon in the Old. Our Florida lizard is a member of the Anolis group,

which contains the prettiest specimens of the lizard tribe. The specific name of our subject is *Anolis principalis.* I have not seen one picture of this exquisite little creature in the popular books but is a shameful caricature. So graceful is it that one cannot look at it long without forgetting its reptilian rank. The head is quite flat, and may be likened to a pyramid, with two of its opposite sides much wider than the other two. The teeth are very small and quite pretty, much like the teeth of the very finest jeweler's saw. They are flattish, and pointed, triangular, and the back ones have on each side of the tooth a little spur, also the shape of the central part of the tooth. When first seen the feet present a striking appearance, owing to the very wide and sprawling divergence of the toes, each of which, except the fifth, which is almost rudimentary, is flattened out into a leaf-like spread at the last joint, or the joint next to the delicate, bird-like claw. The scales of the back and sides are so delicate as to give the appearance of a very fine shagreen. Altogether the animal has the aspect of grace and frailty. The one on my table measures seven and a quarter inches from front of lip to tip of tail, which at its base is the one eighth of an inch in diameter, whence it tapers gradually until it ends in the thickness of a mere thread. Indeed, of the seven and a quarter inches total length, four and a quarter are taken up by the tail, so that the actual body is but three inches long. And this airy little body has hind limbs an inch and a half long, giving it great jumping power. In my specimens, contrary to the descriptions in the books, the normal color is a bronze-brown for the back and sides, with a central stripe along the vertebral column of a steel-gray. This warm bronze is made deeper by the presence of innumerable minute markings of lines, zigzags, and chevrons, of a very dark brown. The entire under side is of an ashy or greenish white.

Soon my pets made themselves at home. Two of them, however, were evidently ailing. In fact, only one of them quite got over the rough experience already mentioned. The principal food furnished them was flies, of which they were very fond. We would put them into the fernery unhurt, so as to see the Anoles catch them. The two ailing ones showed little energy in the matter, and, in truth, took their food daintily. The conduct of the other was very different. He would set himself up so pertly, and would cock his bright eyes so knowingly at us, and at a fly at the same time, that we came to regard him with special partiality. His movements were so quick and graceful, and withal he

was so watchful, while the others were so stupid, that he won for himself the pet term Nolie. Indeed, Nolie became, despite his timidity, quite entertaining. For one with so little in his head his ways were often smart, and sometimes there was just enough of selfishness to make things spicy. If he saw a fly walking in the moss, there was first that quick twitch of the head which brought one eye squarely upon his prey. This was to reconnoitre the situation. Then followed the quickest little poke of that nose like a shot, and the fly was taken in and most legitimately "done for." The captor would slightly elevate his muzzle, give two or three champs of the serrate jaws, at least two real efforts at deglutition, and the prey would disappear. Now in this little act of picking out the fly from its entanglement in the leaves of the Sphagnum, it is worthy of note that the whole process had all the precision of an engineer's formula, it was so direct and so neatly done. One of my children put two small toads in with the lizards. As all know, the toad has a projectile tongue with a glutinous tip. This is darted at an insect, which is inevitably captured, and disposed of in the twinkling of an eye. How often, even with so perfect an apparatus, have I seen the toad bring into its mouth, besides the prey, some extraneous object, such as a bit of leaf or straw. Anolius does its work better than that, though its tongue gives it no aid whatever.

I have just been watching Nolie eying a fly which was walking on one of the glass panes of his house. He made a noiseless advance of about three or four inches; then followed a spring, when he was seen cleaving to the glass by his feet, and champing the captured fly. I saw him once intently watch the movements of a fly which was walking on the glass. As seemed evident to me by an ominous twitch of that little head, his mind was made up for a spring; but lo, there was a simultaneous make-up of mind on the part of the fly, which at this juncture flew towards the other side of the case. Then came — and how promptly — mental act number two of Anolis, for he sprang as the after-thought directed, and caught the insect on the fly, midway between the two sides of the fern case. There was surely very fine reckoning here. And what definite decision and prompt execution! At one time one of the feeble ones, as it hung in a corner of the case by its adhering feet, to my joy caught a fly which happened to walk right before its nose. Nolie had been eying this fly, and probably he was only waiting for the insect to be still a moment on the glass. He had waited too long. So, at any rate,

he seemed to think; for with one leap he nipped the protruding end of the insect, and snatched it from the mouth of its proper captor. "Ah, Nolie; that is very naughty of you, but quite funny; there is so much of human sharp practice in it."

In August the dreaded potato beetles, *Doryphora decemlineata*, were with us in great numbers. It occurred to me to put some into the fern-case. The little toads saw them at once, and their big goggle eyes gleamed with ogreish satisfaction. Quicker than the feat can be recorded one of the Bufos swallowed three of those dreadful spearmen, and his comrade did the same by two. The Doryphoras were thus literally taken in, and the Bufos metaphorically likewise. It was specially observable of the one which had swallowed the three spearmen, despite the grotesque gravity of his demeanor, that there was a certain dolorous air about him, as of one suffering from an overdose of Doryphora. Though kept some two weeks with no other food, neither Bufo would touch a spearman again. And as to Anolis? Ah, he was not the fellow to be caught thus. Was our Nolie more knowing than they? He assuredly was more circumspect, and did not "go it blind." It was plain that he could not stomach these offensive strangers. I noticed that Anolis did not fancy beetles, any way. It was fond of the diptera or flies, while an occasional spider was taken with a keen relish. Speaking of spiders in this connection, I am reminded of a kindly humorist who sent from Florida, to a friend, a box of mourning moss, *Tillandsia usneoides*. He had put into the moss, for mischief, one of these inoffensive lizards. The box reached its destination, and when opened, out popped the little prisoner. "Oh, the dreadful thing! Don't touch it! You 'll get poisoned, just as sure as you do!" There was quite a consternation, and the unconscious disturber of the peace was summarily consigned to a young lady friend of ours, "who delights in bugs and such horrid things." It was a lucky transfer for poor little Anolis. That gentle girl carried her new pet safely through the winter not without care and good judgment. She fed it chiefly on spiders, then almost the only procurable food. To obtain them the outhouses and barn lofts were made to yield to her scrutinizing search. And so well was all this done that when spring came, and insect food abounded, her little chameleon, as she called it, was in prime condition. They are very fond of spiders. Bell tells of a pet *Anolis principalis* catching the large garden spider, *Epeira diadema*, by one leg. The spider bit the little fellow on the lip, and death soon ensued.

When the first sharp days of October set in, the lizard surprised me by a specimen of adaptation to circumstances. It had seemed hitherto incompetent for anything of that sort. It selected a hummock of dry Sphagnum, and with its nose worked a hole something after the manner of a toad while making its hole. Letting it do all it could alone, I then deepened the little burrow with my finger. This was to be its sleeping-place, and the little troglodyte has occupied it steadily, and has slept in it every night now for five weeks.

This 6th of November is delightfully bland, following as it does a raw, bleak day. The sun is now full upon the fern case in the window, and Nolie puts its head out of his sphagnum cave. After many twitchings right and left, for about ten minutes, it resolves to go out for an airing. There is something interesting in the seeming contradictions of these little beings. One while you would think from their movements that they were all impulse and flash, so rapid and jerky, and in such unexpected directions, are their movements. There is so much circumspection in those eyes — a literal looking around things from which one might infer deliberation in every act. Whatever may be the preliminary thinking, the execution is all impulse, flash, and dash. Still, there is one notable exception to all this. It is in the matter of undressing himself, an operation which comes off several times in the season. Nothing can possibly be more deliberate. Previous to the undertaking it looks much as did Patrick's parrot when thinking intently on nothing, although with Anolis there is real head-work going on. In fact, its head is actually turning gray, yes, almost white. There is a serious corrugation of the scalp, then a splitting of the cuticle. It now rubs the head against one of the posts at the corners, thus pushing the skin back on to the neck, on both sides of which the loosened cuticle stands out like a flange, or stiff collar of extravagant proportions. As the sunlight shines through, it has a decided hue, namely, the pale blue of tempered steel, which by a trick of the trade is so exaggeratingly imitated by painting on certain steel implements, as axes and scythe blades. So the creature sits in the sunlight, forcing upon us the most ludicrous associations by its great stand-up collar. We are reminded of the vain servant on his Sunday parole, with collar broad and reaching to the ears, stiffly starched and overblued. "Massy on us, Julius!" said his fellow-servant, "if you should fall down atween dose new scy' blades, you permit suicide, most sartin!" In the sunlight this ragged cuticle is ex-

tremely pretty: a delicate pale translucent blue; and the scale markings so minute as to suggest a lace work that is too fine for the execution of any loom. But to Anolis all this is "gauzy frippery" now, and its presence irksome. A few more rubs and pushes, and in a ragged condition it is got back to the thighs. The persistent creature now succeeds in so flexing its head as to get it flat sidewise on its neck, when it seizes the ragged edge of the old garment with its teeth. There is some tugging, followed by one or two tumbles over, when off comes a large piece of the vestment. What then? It is swallowed! Then the head and neck and one front limb are denuded. It turns now to the other front limb, on the upper part of which is a piece of loose skin flaring most prominently. Just then a fly approaches provokingly near. With one boot on and one boot off, Anolis makes for that dipteran disturber of his private labors. The fly serves as a luncheon, which disposed of, the lizard resumes its work, and the sharp nose dips into the old clothes again. Anolis is not long in getting off the skin. It is all done piecemeal as just described, and every particle is eaten; even the bits that fall between the plants are carefully picked up. There are several sheddings in one summer. This lizard, I think, has gone through it four or five times this season. Under the microscope a bit of the old cuticle is a beautiful object. This exuvia is the exact mold or impression of the scaly skin which it has left behind. Of course, then, one side of this cast consists of depressions, the other side of elevations, which correspond precisely. Under a quarter-inch objective lens the elevated side is surprisingly like a lot of white peaches spread uniformly on a table. Not truly convex, but gibbous is each elevation, being a little longer than broad. Each has a dark curved line extending nearly its entire length. This line is curiously suggestive of the depression which separates at one side the two cheeks of a peach. Each line begins at the base end of the scale, which corresponds to the stem end of the fruit. Here the line is the widest, when it narrows gently, until it disappears a little before reaching the opposite end of the cast, or, to continue the simile, the flower end of the fruit. At this point the peach similitude stops; for the entire gibbous surface is closely dotted with polygons or several-sided spots. Although not at all regular, yet the sides of these markings are very distinct, and quite easily counted, each having four, five, or six bounding lines; or, since M. Martinet insists on the hard words, these figures are composed of irregular rectangles or parallelo-

grams, pentagons, and hexagons. No two of these round prominences, or peach-shaped scale-casts, touch each other. Themselves of a silvery hue, they are separated from one another by a thicker cuticle, of a much darker color, thus throwing out the rounded casts in bold relief.

And what is the philosophy of their swallowing this cast-off skin? I have seen that pretty newt, the *Triton millepunctata*, exuviate beneath the water. Except the rent made at the head, which is the starting-point of exuviation, the divested skin was entire, even to the very toes, and appeared in the water a gossamer likeness of the animal itself. As soon as it moulted, the little thing would turn round and swallow its cast-off garment, tucking it in entire and untorn. The toad does the very same thing. There must be, I think, some vital economy which is subserved by this singular habit of putting up the old clothes, or, as our juvenile wag suggests, turning the stomach into a clothes-chest. Motive in this matter can hardly be attributed to things so lowly. We are reminded of a somewhat similar habit, and quite as strange, of the educabilia, or higher animals. Dogs, cats, cows, etc., devour their own placenta. The mother dog and cat keep the bed of their litter clean by swallowing the excreta. Our little "Lady," a high-bred diminutive hound, had lately two pups. One died in the night. Her mistress was shocked next morning at finding Lady devouring her dead baby. All had disappeared but the head, when her strange work was arrested. And so cleanly was the whole business, not a stain was on her blanket. Now these animals have no cannibal propensities. Recently a cheetah, the Persian hunting leopard (*Leoparda jubata*), having died suddenly, came into our possession. The animal was in such excellent condition, its flesh so fat and tender, that we offered some choice cuts to a number of dogs, Lady being among them. It was really curious to observe their conduct. They stretched their necks, bringing their noses near enough to smell, but not to touch the strange meat; which done, each turned away in solid disgust. Here gleamed the true nobleness of these educabilia, a proper sense of the fitness of things. Nature hath her mysterious sanctities, and even in the animal reckoning, such matters should be promptly put out of sight.

Anolis can cleave to the glass. The phenomena is precisely, as I understand it, the same as with the sucking disk of the shark-sucker, *Echeneis remora*. With a hand-lens I have watched its toes while adhering to the glass. The flattened pads are as dry

as a bone. But the scales are transverse, each one as long as the pad is wide. They are erectile, too. Now when the animal leaps at an object, intending to adhere to it, these scales are shut down tight, and the ridges all closed. At the precise instant of the impact on the glass which terminates the leap, these transverse scales are raised, or set on edge; thus there are as many ridges as scales, that is, so many transverse pits; and every one of these pits is, by the mechanism just described, of necessity a vacuum. Only four of the five toes on each foot are serviceable in this direction. As the pads of the toes vary much in size, so does the number of the transverse scales. They run from about twenty to thirty. Striking an average of twenty-five for each toe, and multiplying by sixteen, there would be not less than four hundred of these sucking pits, or air-exhausted depressions.

In the popular estimate, the chief interest in this little so-called Florida chameleon attaches to its faculty of changing its color at will. Its two extremes of color are a deep, warm, bronzy brown, and a pale but bright pea-green. Throughout the summer, especially at night, the favorite position of our Anolis was to hang suspended, with head up, from the posts at the corners of the fern case. In this way they invariably spent the night. It was their chosen position for sleep. How often have I taken the lamp and approached their case at different hours of the night, and found them with eyes tightly closed and fast asleep, and their color a bright green. But the posts to which they thus adhered by their feet was of a deep brown color, hence the two colors were set in striking contrast. Throughout the day, although occasionally playing with diverse colors, they were for the most part brown, and this too although walking or nestling among the green leaves. The belief that the color of the contiguous object is mimicked for the sake of protection is, I think, not confirmed by the observed facts. The truth is that in this matter of animals enjoying life there is a higher law than that of mere intention. I shall call it the law of spontaneous expression, which has its base in another law, to wit, that a joy unuttered is a sense repressed. Why should green be the favorite night-gown of our sleeping Anolis? I timidly venture the suggestion that it is because the animal is disposing itself for the luxury of sleep, its color changes being the utterances of its emotions. In these little creatures are united a remarkable agility with an equally marked fragility. They delight in sleep, and they delight in exercise, and take a great deal of both. But they are very

easily tired, and are often seen panting from excessive exercise. Whether it be the expression of enjoyment of repose, comfort, or emotional joy, the highest manifestation is its display of green. Just listen to what I have this day witnessed. Yesterday was quite cold. The fern case was in the window, and a fire was in the room. Still the air was keen and raw. But to-day the atmosphere is mild, and the sun, full upon the window, pours his mellow warmth directly into the fern case. After putting his head forth to inspect the weather, he comes out of his troglodyte chamber, and stretches his brown body in the full blaze of the sun. What a blessed basking this is. To him, in contrast with his cave, it is the luxury of bliss. Nolie soon begins to doze, sleepily opening and shutting his eyes, but keeping both auricles open wide. Now begins that wonderful play of colors. It appears first in the normal bronze brown of the back. Literally they are lively colors, such are the moving changes, as the folds of the skin, especially those on the neck, catch and glance the sunlight. That deep umber is now mellowing into a yellowish brown. A minute more and it has a bronze, coppery tint. Now it runs into an olive-green; anon, a leek-green; at last a pale but bright pea-green. Through all this color transformation on the back there is a medial line extending from the head to the tail, which is always of a hue paler than all the rest. As to the under parts, the customary ashiness is all gone. It is white; but such a white; not glaring, but soft. In fact, I think the tiny scales are now set a little on edge, thus giving the white the aspect of frosted silver. The back, as was said, is green; but I now observe what I have very seldom seen, that, so to speak, over this green is a bloom, so that it looks like a frosted green. It is observable that the top of the flat head doggedly retains its dark normal brown. As to the eyelids, in this matter of color, I think they are the most to be admired. Each of these little brilliant orbs in constant motion is a perpetual twinkle. In ordinary repose the eyelids are a pretty, pale brown. But these organs are especially susceptible of color-change. Not only will they run rapidly through the whole scale, but the positive colors will be spread in such decided and rapid contrast that it seems as if the order were set to the key-note of a humor which "is alone high fantastical." These winking lids emulate the gems. Now, a palish brown, they are smoky topazes. Instantly they become green emeralds, and quicker than one can write flash into the peculiar blue of the turquoise. I have seen the New York

stickleback (*Gasterosteus Noveboracensis*), in its love season, go through changes as bright and rapid; yes, even the gray, cold pupil of its eye would flash into the true blue of heaven. The eye of our Anolis cannot do this. Its colors are fixed. But what a pretty eye it has. The pupil is as the most sparkling jet, and the iris is a ring of limpid amber. But as to these color-changes, it should be borne in mind that they are excited by causes the very opposite in character, love and hate, for they can woo and fight too; also by fear and joy. In the changes just described, I see the manifestation of animal enjoyment. It is Nolie's way of telling it, — his conventional, "I feel good." So dumb is he that this is his only way of getting it out. Only once have I heard any semblance to sound escape him. I had thrown a half-crippled fly at him, which struck on his nose. He let off just the tiniest "umph!" then caught the fly and disposed of it.

The sun has gone down behind yonder house. Nolie knows it. His bright colors have left, and he betakes himself to his little cave.

I had forgotten to say that Nolie's two weakly comrades died within some three weeks of each other. One of them had lain for two days on the mossy bed, and was a beautiful bright green. How we did admire it for those two days, not knowing that its little life had fled. It was somewhat consoling to us all to reflect that doubtless its time had come, and it had died in a green old age. It was put into alcohol, where in a few days the green disappeared, and the normal brown returned. This surprised me, as I had expected a result similar to my experience with the green snake (*Chlorosoma vernalis*), which in alcohol turns blue. Respecting its comrade, it should be added that it also departed this life in a suit of green.

I once possessed a very large Anolis from Cuba. Its body was about ten inches long, and it was quite thick in proportion. That which entertained us greatly was its expansile throat, or dewlap, which it would inflate to an enormous size. This characteristic is to some extent true of our little *Anolis principalis*, and is dwelt upon largely in the books. In this regard I have been disappointed, having witnessed the phenomenon only twice in an entire summer. The spectacle, though strange, is very pretty. The skin under the throat expands immensely, giving to the animal a comical but rather formidable aspect. The colors of the inflated dewlap are very fine, usually ending in a perfect flame of intense scarlet.

A word more must be said of those delicate markings of very dark brown, sprinkled so thickly on the back and sides. As already mentioned, they are made up of little straight lines, zigzags, and chevrons. They are as constant and perhaps as inexplicable as those queer markings on certain minerals, known as "Widmannstattian figures." These tiny markings on the back and sides of *Anolis principalis* are always there, and they never change their color. Even when Anolis has changed from a ruddy brown to a bright green, a hand-lens will show that these figures are all there, and that they have retained their brown color too. And in some way, upon close inspection, it will be seen that whatever the hue may be that is assumed, these singular figures impart to it character and tone.

I think our observations show that the highest effort in color-change is in the green. There were two instances in which it is my belief that this same color was produced involuntarily. It is observable that the Anolis delights in tints. From a deep olive it will run through the entire gamut of that color by insensible hues into a leek green. It does not like harsh color lines. Now on one occasion Nolie had a queer spot break out on his right flank, just behind the fore limb. It was a bright green patch, nearly half an inch in length. The outline was sharp and angular. It was on a cold day, when the room was uncomfortable, just the time when there is no disposition to change color. It is notable, also, that this patch of green upon that dark ground of brown held its brightness for two days, a very long period indeed. At another time, under like circumstances, a smaller patch of the same color appeared on the left flank, near the hind leg. It had the same patchiness as the former spot, and also continued bright for an unusually long time.

Perhaps a hundred times have we been asked the question, "How are these changes of color produced?" The physiology of this matter is not well understood; but there is a hypothesis upon it which is probably in the main correct. To state this in rigid accuracy would likely for some of our readers require too many technical terms. At the risk, then, of appearing to be didactic, we will use very different speech. Supposing through a sheet of block tin many thousands of little pipes were made just to enter. Let them, if you will, be regarded as infinitely small. Call this series A. Now suppose another series in all respects similar and fixed in like manner. Call this series B. It must be understood that the pipes of one series alternate with those of

the other series, so that it shall be first a pipe of A, then a pipe of B, and so on in regular order for both series. Suppose again that the A pipes contain green pigment, and the B pipes contain yellow. We will further imagine that each pipe series has a series of muscles which can act upon them. Now laid over the mouths of all these pigment tubes let us suppose a translucent film. Our perforated block tin and its translucent spread, with the mouths of the color tubes opening between them, shall represent the *rete mucosum*, or colored layer of the skin. Suppose now the appropriate muscles squeeze the lower ends of the A series of pigment tubes, the pigment at once comes up against the almost transparent skin, the color of which is now blue. Let the muscles relax and the pigment descends into the tubes again. Let the same process occur with the B series of tubes, and the result will be that the skin shows a yellow color. Not waiting for the yellow pigment to return into the tubes, let the A series be again squeezed, and up comes the blue pigment against the translucent spread. Now everybody knows that a green color is easily made by a mixture of yellow and blue. Suppose the little spots where the blue touches under the translucent film to be so small as to be called molecules, and suppose the same of the spots where the yellow pigment touches, and you have all the conditions necessary for begetting green. It is also easily imagined how by regulating the amount of muscular pressure the proportions of the separate pigments is regulated, and so the most delicate tints are produced.

At the dining table of a hotel in Florida a lady appeared with her four pet Anoles. They were fastened to her head-gear by silken threads, and ran over her neck and head, or nestled in the tresses of her hair, as they saw fit. In this particular we think the lady did violence to the rights of others. But duly regarding the proprieties of time and place, the lady did well in her delight with her "little chameleons." As a pet, the *Anolis principalis* is everything that is commendable: clean, inoffensive, pretty, and wonderfully entertaining; provoking harmless mirth, and stirring up in the thinker the profoundest depths of his philosophy.

THE PROPER SPECIFIC NAME OF THE SONG SPARROW.[1]

BY DAVID SCOTT.

IT appears that this common little bird has been known for over a half century by a specific name which, if the just rule of priority is considered, cannot be applied to it longer.

The observation of a specimen which presented a rather unique appearance — the tail being veined by transverse dark brown bars, quite sharply defined — discovered the fact to me.

Recent examination of numerous specimens shows that this feature is more or less apparent in nearly all examples. It seems, however, to have been unnoticed since Pennant wrote until the obtaining of my specimen, which was some two years ago, for no author in his description of the bird has shown an acquaintance with the peculiarity; but quite the reverse, as Professor Baird distinctly affirms[2] that the tail of the song sparrow displays no such appearance as the following descriptions would imply.

Pennant's description is: With the crown, hind part of neck, and back rust colored, spotted with black; the spots on the back large; coverts of the wing plain ferruginous; primaries dusky, edged with dirty-white; whole under side white, with black streaks pointing downwards; tail brown, crossed by numerous dusky bars. Inhabits New York. (Arctic Zoölogy, ii. 375.)

Gmelin writes: Fringilla ferruginea nigro-maculata, subtus alba nigro-striata, alis ferrugineis, cauda fusca atrolineata. Habitat in Noveboraco. (Systema Naturæ, i. 922.)

Who can doubt but that these descriptions refer to the song sparrow, if they do differ in a few minor respects?

We think it follows from the above citation from Pennant

[1] MELOSPIZA FASCIATA.

Fasciated Finch Pennant, Arct. Zoöl., ii. 375.

Fringilla fasciata Gmelin, Syst. Nat., i. 1788, 922. — Latham, Index Orn., i. 1790, 445. — Nuttall, Man. Orn., i. 2d ed. 1840, 562.

Fringilla melodia Wilson, Am. Orn., ii. 1810, 125. — Licht., Verz., 1823, No. 249. — Aud., Orn. Biog., i. 1832, 126; v. 507. — Ib., Syn., 1839, 120. — Ib., Birds Am., iii 1841, 147. — Max., Cab. Jour., vi. 1858, 275.

Zonotrichia melodia Bon., List, 1838. — Ib., Conspectus, 1850, 478.

Melospiza melodia Baird, Birds N. Am., 1858, 477. — Coues, Key, 1872, 139. — Baird, Brewer and Ridgway, Hist. N. Am. Birds, ii. 1874, 19.

Melospiza fasciata Scott.

[2] "The fasciated sparrow of Pennant, Arctic Zoöl., ii. 375, upon which Gmelin's name is based, answers pretty well for our species, but the tail is said to be crossed by numerous dusky bars, which is not the case with *melodia*." — Foot-note, Pacific Rail Road Reports, ix. 1858, p. 477.

that our song sparrow was the bird he had in hand when he penned his portrayal and suggested the name "fasciated sparrow" (upon which Gmelin's name is founded); moreover, as the latter author's name antedates the one assigned by Wilson, it follows, therefore, that *fasciata* should take precedence, to the elimination of "*melodia.*"

It may be urged, however, that *fasciata* is not entirely appropriate, and *melodia* having been recognized as the correct name so long, a change is unnecessary; and that if this work of restoration begins there will have to be many other changes in ornithological nomenclature. But we say, Let it begin; let all the old names that can lay claim to restoration, and be recognized as applying to present species, be brought to light and receive due consideration.

The *Chamæa fasciata* Gambel furnishes a parallel case with the song sparrow in the possession of a barred tail; and the bars are no more appreciable, in fact less so, than in some individuals of the *Melospiza.*

Now, if this name is currently recognized as applicable to the *Chamæa*, with its distinctive feature less marked than in *Melospiza*, why should it not hold good with the latter?

In the Smithsonian collection are specimens of the western varieties—*fallax*, *rufina*, *guttata*, *Gouldi*, and *Heermanni*—which possess quite visibly barred tails.

NEW ZEALAND FLAX.

BY J. C. RUSSELL.

THE attention of the traveler who stands for the first time on the shores of New Zealand is especially attracted by two characteristics of its flora, one or the other of which will be present in every scene that impresses itself on his memory.

The first is the profusion everywhere of ferns of many different forms and colors, which present every gradation, from the strange and graceful tree-ferns, which raise their spreading crowns of feathery fronds thirty or forty feet from the ground, down to the little bright green ferns, with fronds scarcely half an inch long, which cling to the rocks far below in the dark ravines, where they are constantly wet with spray.

The other plant which especially calls for his examination, and

which is the subject of our sketch, is a flag-like, liliaceous plant, growing in large spreading clusters of sword-shaped leaves, which are often eight or ten feet in length, and of a bright, shining green color. Many of these bunches support an upright flower-stalk, with purple blossoms, which resembles, somewhat, the inflorescence of the banana, held in an upright position. This plant is known to the colonists as New Zealand flax, and to the botanist as *Phormium tenax*, of which several varieties have been described.

It is very characteristic of New Zealand, being found nowhere else, except on the Norfolk and Chatham Islands.

During our stay in New Zealand we found it growing wherever we went, from the low shores of the southern part of the South Island, where it covers immense fields, up to an elevation of four and five thousand feet among the southern Alps.

The spreading masses of Phormium growing among thick groves of the palm-like grass-tree (*Cordyline australis*) give to many retired nooks and valleys a soft tropical beauty, that forms a pleasing contrast with the usual rugged and Alpine grandeur of New Zealand scenery.

The New Zealand flax covers thousands of acres, both in the North and South Island; this amount, although vast, could be increased many fold by cultivation. Seemingly, it likes best the low, wet land near the coast, but also grows with great luxuriance along the banks of rivers and lakes, where it can obtain plenty of moisture.

To the natives of New Zealand, before the blessings of civilization (?) were thrust upon them, the Phormium was what the cocoa-nut palm is to the inhabitants of the tropics, or the bamboo to the Hindoo and Malay. The Maori woman, sitting on the earthen floor of her hut, makes an incision across a leaf of Phormium with the sharp edge of a mussel-shell; then placing the leaf on the edge of the shell, with the cut side up, rapidly draws it between her thumb and the shell, thus stripping off the green pulp, and leaving the tough fibre ready for use.

Of this the Maoris weave their mats and rugs, which are very soft and warm, and often wrought in an elegant pattern by means of colored Phormium.

These mats, together with garments made of the dried, undressed leaves, formed the scanty clothing of the natives before the coming of the Europeans.

The dried leaves, when split into narrow strips, are used to

make coarse matting for the floor, and baskets to contain fruit and serve as dishes.

The long, tough fibre is made into strong nets and fishing-lines, and is also of great use in building houses, canoes, etc.

The stone adzes with which the Maoris dug out and ornamented their canoes were lashed to wooden handles by bands of Phormium, which also furnished the canoe with sails.

The clear white gum that exudes from the base of the leaves is used as glue and also for chewing; with the colonists it forms an excellent substitute for mucilage and sealing-wax.

The bright-eyed Maori boy makes his toy canoe of the green leaves, and gathers the sweet honey from the blossoms of the Phormium.

At the present day the more enlightened natives use it instead of writing-paper, and "with a sharp-edged shell engrave their thoughts upon it."

One night while spearing the monstrous eels that inhabit the New Zealand lakes, we became acquainted with another of the uses of this interesting plant; the old dead leaves, when bound into small bundles, made excellent torches, which answered our purpose nearly as well as pine knots, with the use of which most of us are familiar.

These are a few of the purposes for which Phormium is used by the simple New Zealander.

To civilized man it would become a hundred-fold more useful, could he but invent a cheap and satisfactory method of cleaning the fibre.

This fibre has been found by experiment to be the strongest known, with the exception of silk, being twice as tenacious as common hemp.

Numerous machines have been invented to meet this want, but as yet none have been a success.

Could such a method be devised, this strong and beautiful fibre would compete favorably with the manilla of the Philippine Islands, or the flax and hemp of Europe and America.

Such a discovery would bring to New Zealand greater wealth than she has derived from her gold mines, and, together with the immense amount of wool that is annually shipped from her shores, make those rich islands eminently a fibre-producing country.

With the imperfect means at their command the colonists have already produced considerable quantities of dressed Phormium. This, in former years, was small in quantity, but of an excellent

quality, being prepared by the Maoris. In 1870, there was sold in the London market four thousand tons of Phormium fibre; this, however, was of an inferior quality, having been imperfectly prepared by machines. Its principal use is, at present, in the manufacture of ropes, for which purpose it is usually mixed with manilla. Numerous chemical means have been resorted to for obtaining the fibre, but without satisfactory results. Thus far civilized man, with all his array of machines and engines, has been unable to do the simple work of cleaning the Phormium fibre as well as the tattooed cannibal did with a sea-shell.

THE AVAILABILITY OF CERTAIN BARTRAMIAN NAMES IN ORNITHOLOGY.

BY J. A. ALLEN.

UNDER the caption "Fasti Ornithologiæ Redivivi.—No. I. Bartram's Travel's," Dr. Elliott Coues has recently[1] attempted to revive sundry of Bartram's names of the birds of the United States, on the ground of their priority. Dr. Coues assumes that Bartram was "on principle binomial, occasionally lapsing;" and that "if his occasional slips are to count against him, then not a few great modern ornithologists must also be ruled out; among whom may be instanced Schlegel, Bonaparte, Sundevall, and others, in whose writings are found trinomial names," etc. "But the count against him [Bartram] for nearly a century," says Dr. Coues, "is not a true bill; the verdict must be, if not reversed, radically modified." Since a few of Bartram's binomial names have come into current use, whilst others are commonly cited in synonymical lists, Dr. Coues claims that if Bartram is entitled to anything, he has not received what is rightfully his due, and if not entitled to anything we have given him tribute to which he has no claim. Dr. Coues adopts the former alternative, and on the ground of consistency advocates the adoption of all of Bartram's binomial names that can be identified, in cases where they happen to have priority, whether they are accompanied by descriptions or not.

Before accepting fully the results that follow such premises, let us examine a little into the nature of Bartram's work. The ornithological matter contained in Bartram's Travels is notably of two kinds. In the general narrative he has at sundry

[1] Proc. Acad. Nat. Sci., Phila., 1875, pp. 338–358, September, 1875.

places described not only the habits and distribution of some of the birds he met with in his travels, but has given more or less careful descriptions of the birds themselves, designating them also by binomial names. In addition to this he has given, at pages 288–296, a nominal list of two hundred and fifteen species, in which he has usually mentioned the species under Latin binomial names, to which he has added an English name; occasionally to the Latin names he has appended a few words of description, also in Latin; while certain typographical signs are prefixed to denote the places of residence of the different species and their migrations. These signs, with the simple names, constitute in most cases all that approaches to a description of the species that Bartram has given; yet the attempt is now made to establish priority for these names, on the ground that the species thus designated were sufficiently described to substantiate the claim, and to set them up in place of names backed by good description and thoroughly familiar through long use.

In this list of two hundred and fifteen species, quite a number of names prove to be synonymous with others; thirty-six are given by Dr. Coues as "undetermined," and ten or a dozen more are only guessed at; leaving fully one fifth of the whole number almost hopelessly in doubt. In addition to this there are thirty-five or more *polynomial* names. Of the one hundred and eighty species of the names of which Dr. Coues attempts to give the present equivalents, nearly all had been previously described in the Systema Naturæ of Linnæus, a work that must have been accessible to Bartram if any European book on natural history could be; and that it was so is evident from his references to it in the botanical portions of his work. Bartram has, in fact, in some groups employed a large proportion of Linnæan names, while in others he has either altogether ignored them or was ignorant of them. Of his twenty-two species of rapacious birds, all but three of the recognizable species were already in the Systema Naturæ, yet only *five* of them appear under the Linnæan names; of his seventeen remaining names only *one*, *Vultur atratus*, is strictly entitled to recognition. Of the rest of the land birds, numbering one hundred and seven species, a dozen of the names are either polynomial, synonyms, or undeterminable, while of the remaining ninety-five, eighty of the species had been previously named and described in the Systema Naturæ, or by other writers preceding Bartram; yet less than half of these names were used by Bartram, who instead gave

new names of his own. In the rest of the list, embracing the wading and swimming birds, the case is even still worse. Of these, numbering eighty-five species, nineteen are given by Dr. Coues as "undetermined;" fifteen others are guessed at only, three are synonyms, and fifteen of the names are polynomial! Of the thirty-three binomially named species determined by Dr. Coues, twenty-eight had been described in the Systema Naturæ; of the remaining five, Dr. Coues regards three as available. Finally it appears that after excluding from Bartram's list of two hundred and fifteen species the synonyms, the polynomial names, and the undeterminable ones, we have left but one hundred and forty-six, or about two thirds of the whole; and that of these one hundred and thirty, or thereabouts, had been named and described several years prior to the publication of Bartram's work, mainly, too, in the Systema Naturæ, a book that to Bartram must have been one of the most accessible works on natural history.

Dr. Coues, however, has indicated twenty Bartramian specific names and one generic name which he claims must be adopted, in order that Bartram may have his due as one of the fathers of American ornithology. We are, of course, not to judge the scientific works of a century ago by our present standards, but making due allowance for the two periods, it would seem that in the recognition Bartram has already had, he has been most fairly dealt with, and that further claims for him will only call forth a more rigid criticism of his merits as an ornithological writer than his work will well bear. Ten of these twenty-one Bartramian names, however, Dr. Coues claims, have been for a long time currently in use, six of them having been "erroneously" attributed to Wilson and one to Audubon. The remaining ten Dr. Coues proceeds to newly "set up."

But let us examine Bartram's work still further. First, respecting Bartram as a binomialist: we find that out of two hundred and fifteen names in his list thirty-six are not binomial, or more than *one in seven*, — pretty frequent lapses for a "binomialist on principle." Secondly, we find that the Bartramian names already in current use or quoted as synonyms belong to species that he not only binomially named, but to species which he more or less fully described in his narrative, though some, it is true, are taken from among those of his list. Thirdly, it seems that the species for which Bartramian names have been currently employed, but "incorrectly" attributed to Wilson or

Audubon, were never described, in any true sense, by Bartram, and would be undeterminable if their recognition depended on anything in Bartram's work. We have in nearly every case only the name, which, being a characteristic one, is presumably referable to the species to which it was subsequently applied by Wilson or Audubon, who were the first to give anything which, by any reasonable license, can be construed as a "description" of the species in question. In most cases Wilson may have obtained the names directly from Bartram, since, as is well-known, William Bartram was not only the friend of Wilson, but his associate and instructor in natural history; and it is hardly presumable that Wilson did not know, through personal intercourse with Bartram, the birds the latter had named in his Travels.[1] Besides this, the natural applicability of the names to the species in question may have rendered the names in a measure traditionally current. Other names which have not that happy suggestiveness, but which are in all other respects wholly parallel, figure prominently in the long list of Bartram's species that Dr. Coues, with all his ability as an ornithological expert, has had to give as "undetermined." The specific name *palustris*, when applied to a sparrow or a wren, may be distinctive when it happens that only one species of the group to which the species belongs affects marshy situations, but as soon as a second is found, the name of course has then no distinctive value. Coincidences of this kind are all that make *many* of Bartram's names determinable; and this merely chanced to be so, happening otherwise, however, in numerous instances, as witness the in other respects parallel cases of "*Falco pullarius*, the chicken hawk," "*F. gallinarius*, the hen hawk," "*Fringilla canabina*, the hemp bird," "*Calandra pratensis*, the May bird," etc. Fourthly, the remarks above given under "thirdly" are also strictly applicable to nearly all of the Bartramian names newly set up by Dr. Coues, these being determinable only by negative evidence and not by anything inherent in Bartram's work, — simply through a process of exclusion by virtue of a full knowledge of the avi-fauna of the region in question; by knowing that they cannot well refer to anything else. For nearly or quite half a century after Bartram wrote, such a thing would have been impossible, simply from lack of this necessary knowledge of the fauna of the region to which Bartram's work refers.

[1] In the case of Audubon, the single instance of the use of the same name may perhaps be properly regarded as a coincidence.

Lists like Bartram's are not of rare occurrence, where the authors, not having the means of readily determining the species, or not caring to take the trouble to do so, give the correct names when they happen to know them, and prefer coining names for the others as the easiest way out of a difficulty.

Finally, let me ask students of zoölogy — for the principle involved is not, of course, limited to ornithology — if searching for old names, which, like those of Bartram's, can only be determined by the process of exclusion, with which to supplant long-established ones, intelligently proposed and backed by adequate descriptions, tends to the best interest of science? If the example Dr. Coues is here setting is to be followed, there will be no stability to our nomenclature for a long time, but only, except perhaps to a few experts, the most perplexing confusion. The advocacy of such revolutions on the score of *justice* is, it seems to me, calling things by wrong names, robbing, as it does, intelligent workers of the recognition justly their due, whenever circumstance may favor the deciphering of the hieroglyphics of earlier slovenly or ignorant writers, of which their own works would never afford an interpretation. Such researches may be of interest from an antiquarian point of view, but they should end with their legitimate results, and not be pushed with a view of overturning long-settled names in zoölogical nomenclature. I herewith append a list of the Bartramian names (given in quotation marks) which Dr. Coues wishes to see set up, with the nomenclature resulting from his determinations, together with their usual equivalents, and with a few critical remarks on special points.

1. "VULTUR ATRATUS, black vulture or carrion crow" = *Carthartes atratus* (Bartr.). Elsewhere well described.

2. "FALCO GLAUCUS, the sharp-winged hawk, of a pale sky-blue color, the tip of the wings black" = *Elanus glaucus* (Bartr.) Coues = *E. leucurus* auct. Otherwise further described.

3. "FALCO SUBCERULIUS, the sharp-winged hawk, of a dusky blue color" = *Ictinia subcœruleus* (Bartr.) Coues = *I. Mississippiensis* auct. Otherwise further described.

4. "CORVUS CARNIVORUS, the raven" = *Corvus corax*, var. *carnivorus* (Bartr.) B. B. and R. Adopted in 1858 by Baird, but Bartram's whole description consists of the names here given in quotation marks, with a mark prefixed denoting that it is one of the species that "arrive in Pennsylvania in the *spring* season, from the *South*, which, after building nests and rearing their young, return again *southerly* in the *autumn*." At page

179 Bartram speaks of seeing "the vultures and *ravens* crouched on the crooked limbs of the lofty pines," etc., in East Florida. Is Dr. Coues willing to extend the former range of the raven over East Florida, and admit it as a *summer migrant from the South* to Pennsylvania, accepting Bartram as authority, and amend his ornithological writings to correspond? Consistency certainly calls for this if we adopt Bartram's name, and "consistency is a jewel," says our author.

5. "CORVUS MARITIMUS, the great sea-side crow or rook" = *Corvus maritimus* Bartr. = *C. ossifragus* Wils. Based on the name and the indication of its habitat, though "great," as compared with the others, is erroneous. The ambiguity that overshadows *C. carnivorus* throws additional doubt upon the identity of *C. maritimus* with *C. ossifragus*.

6. "CORVUS FRUGIVORUS, the common crow" = *C. frugivorus* Bartr. = *C. Americanus* Aud. Based on the name alone and "exactly parallel," says Dr. Coues, with the case of the raven.

7. "CORVUS FLORIDANUS, pica glandaria minor, the little jay of Florida" = *Cyanocitta Floridana* (Bartr.) Bon. = *Aphelocoma Floridana* (Bartr.) Cab. At page 212 distinguished from *Cyanura cristata*.

8. "GRACULA PURPUREA, the lesser purple jackdaw, or crow blackbird" = *Quiscalus purpureus* (Bartr.) Cass. This rendering is evidently not tenable, since the *Gracula quiscula* of Linnæus (1758), as shown by his description in the Systema Naturæ, refers to this species and not to *Q. major*, though possibly some of the references may. Hence if *quiscula* is to be used for either of the *Quiscali*, it must be used for *purpureus* and not for *major*, although Bartram employed it for *Q. major*, and on this ground Dr. Coues suggests its adoption for that species.[1]

9. "CERTHIA RUFA, little brown variegated creeper" = *C. familiaris*, var. *rufa* (Bartr.) Coues, "with those who separate the bird from the European" = *C. Americana* auct.

10. "CERTHIA PINUS, the pine creeper" = *Dendrœca pinus* (Bartr.) Bd. "The name," says Coues, "is universally attributed to Wilson, but we see here its original source." Are we quite

[1] "GRACULA QUISCULA, the purple jackdaw of the sea-coast" *Bartram.* Dr. Coues says, "The expression 'purple jackdaw of the sea-coast' is perfectly diagnostic, the species being thoroughly maritime and always called jackdaw in the countries it inhabits." It, however, shares the name "purple jackdaw" with *Q. purpureus*, see Catesby and subsequent early writers. "To those to whom," Dr. Coues continues, "such alliterative names as *Sialia sialis, Cupidonia cupido*, etc., are unobjectionable, I suggest the propriety of calling this species *Quiscalus quiscula*."

sure? Is it not more likely to be the *Helminthophaga pinus*, which is the "pine creeper" of Catesby, and the *Certhia pinus* of Linnæus, since Bartram often quotes Catesby, even in his list, and many of his trinomials and English names are the same as those of Catesby, and evidently adopted from Catesby.

11. "LUCAR LIVIDUS, apice nigra, the cat bird or chicken bird" = *Lucar Carolinensis* (Bartr.) Coues = *Mimus Carolinensis* auct. Dr. Coues, presuming "apice nigra" was intended to read "vertice nigra," which of course is probable, adopts the name *Lucar*, though "probably meaningless" and looking "like a misprint," for the generic name of the cat bird, as being coequal with *Felivox* of Bonaparte and *Galeoscoptis* of Cabanis, and as equivalent to *Mimus* in case the cat bird and mocking birds are to be placed in the same genus.

12. "MELEAGRIS AMERICANUS, the wild turkey" = *Meleagris gallopavo*, var. *Americana* (Bartr.) Coues. As it is fully described at pages 14 and 83, and binomially named on page 83 as *Meleagris occidentalis*, this, if either of Bartram's names is to be adoped, is the one which, *according to the rule of priority*, *must* be adopted, *M. occidentalis* having the precedence of over two hundred pages in Bartram's work. Hence we have *Meleagris gallopavo* var. *occidentalis* (Bartr.)! The name *occidentalis* was evidently given in allusion to its being an inhabitant of the western world, as he compares it with the *Meleagris* (*Numida meleagris*) of Africa.

13. "CARDUELUS PINUS, the lesser goldfinch" = *Chrysomitris pinus* (Bartr.) Bon. First described by Wilson under the same specific name, which name, as Dr. Coues observes, has been usually attributed to the latter author. Bartram's right to priority rests solely on the Latin and English names above given, which may be *presumed* to apply to *Chrysomitris pinus* auct.

14. "PASSER DOMESTICUS, the little house sparrow or chipping bird" = *Spizella domestica* (Bartr.) Coues = *Spizella socialis* auct. This is another of the lucky cases where the name alone seems to determine the species with probable certainty.

15. "PASSER PALUSTRIS, the reed sparrow" = *Melospiza palustris* (Bartr.) Bd. First described by Wilson under the same specific name, to whom the name has heretofore been attributed, but is now transferred by Dr. Coues to Bartram, because he presumably used the name for a swamp sparrow, and because we chance to have but one!

16. "PASSER AGRESTIS, the little field sparrow" = *Spizella*

agrestis (Bartr.) Coues = *S. pusilla* auct. First described by Wilson under the specific name *pusilla*, unless it be Gmelin's *Motacilla juncorum*, as some have supposed possible. Several of our sparrows would better bear the epithet "little field sparrow" than this; as, for example, *Pooecetes gramineus* and *Coturniculus passerinus*, and also *Passerculus savanna*, unless the latter should be considered too northern for the asterisk in Bartram's list. *Spizella pusilla*, though now known as "field sparrow," is only found in fields bordered with thickets or partly overgrown with bushes.

17. "MOTACILLA DOMESTICA (*regulus rufus*), the house wren" = *Troglodytes domestica* (Bartr.) Coues = *T. aëdon* auct. Without the English name "house wren," "*Motacilla domestica*" would be wholly undeterminable.

18. "MOTACILLA PALUSTRIS (*reg. minor*) the marsh wren" = *Cistothorus palustris* (Bartr.) Bd. First *described* as *palustris* by Wilson, to whom, as Dr. Coues says, this Bartramian name has usually been attributed; but why is not Bartram's *palustris* as likely to be *Cistothorus stellaris* as anything else?

19. "ARDEA MUGITANS, the marsh bittern, or Indian hen" = *Botaurus mugitans* (Bartr.) Coues = *Botaurus lentiginosus* auct. Can the above names be allowed as a basis for priority, "the marsh bittern" being the only really descriptive part?

20. "TANTALUS PICTUS (Ephouskyka Indian), the crying bird, beautifully speckled" = *Aramus pictus* (Bartr.) Coues = *A. giganteus* auct. Elsewhere fully described.

21. "COLYMBUS FLORIDANUS, the great black cormorant of Florida, having a red beak" = *Graculus Floridanus* (Bartr.). First described by Audubon under the same specific name, probably merely by a coincidence. The "red beak" Dr. Coues explains as a lapse of memory for "red gular pouch and lores."

From the foregoing it will be seen how very slight are the claims Bartram's names have to priority over those in current use. Of the twenty-one given above, Nos. 1, 2, 3, 7, 11 (the generic name only), 12 (*occidentalis*, not *Americana*), and 20, — six or seven in all, — are the only ones that, in justice to all parties, can rightfully stand. One (No. 10) has been shown to be almost unquestionably Linnæan, not Bartramian.

In conclusion, I would suggest to the author of the article under review, who seems so zealous in the vindication of a truly sagacious naturalist, the propriety of also claiming for him priority in the discovery of the geographical law of variation in size in North

American mammals, — a law it took naturalists fifty years longer to develop and formulate, — since Bartram repeatedly alludes to the smaller size of animals of the same species in Georgia and Florida than in Pennsylvania, especially the wolves, deer, foxes, "and other animals." At page 216 of his Travels, for instance, after referring to the small size of the horses of Florida, he says, "It is a matter of conjecture and inquiry, whether or not the different soil and situation of the country may have contributed in some measure in forming and establishing the difference in size and other qualities betwixt them. I have observed the horses and other animals in the high hilly country of Carolina, Georgia, Virginia, and all along our shores, are much larger and stronger than those bred in the flat country next the sea-coast; a buck-skin of the Upper Creeks and Cherokees will weigh twice as heavy as those of the Siminoles or Lower Creeks, and those bred in the low flat country of Carolina."

THE HARVARD SUMMER SCHOOL OF GEOLOGY.

BY PROFESSOR N. S. SHALER.

THE first session of this, the last to be established of the several schools for summer teaching which have been originated by the officers of Harvard University, held its first session at Cumberland Gap, Kentucky, during the past summer. The design was to give practical field instruction in geology to teachers and others of some training in science and general culture, who might desire to acquire the methods of such work. The Governor of Kentucky having given an invitation to the President of Harvard College to place the school in Kentucky, and having offered the coöperation of the Kentucky Geological Survey, the school was established at Cumberland Gap, within the State of Kentucky but near to the state lines of Tennessee and Virginia. Though remote from the routes of travel, this point offered peculiar advantages for the study of stratigraphic, topographical, and dynamic geology. The structure of the Appalachian mountain system is exceedingly well shown at this point; the section extends from the lower Potsdam sandstone to the middle coal measures, giving about twelve thousand feet of beds within forty miles of distance; a wonderful system of faults of different ages bring these beds to view at many different points and enable the student to observe them under varied conditions; a short distance away, within plain

179 Bartram speaks of seeing "the vultures and *ravens* crouched on the crooked limbs of the lofty pines," etc., in East Florida. Is Dr. Coues willing to extend the former range of the raven over East Florida, and admit it as a *summer migrant from the South* to Pennsylvania, accepting Bartram as authority, and amend his ornithological writings to correspond? Consistency certainly calls for this if we adopt Bartram's name, and "consistency is a jewel," says our author.

5. "CORVUS MARITIMUS, the great sea-side crow or rook" = *Corvus maritimus* Bartr. = *C. ossifragus* Wils. Based on the name and the indication of its habitat, though "great," as compared with the others, is erroneous. The ambiguity that overshadows *C. carnivorus* throws additional doubt upon the identity of *C. maritimus* with *C. ossifragus*.

6. "CORVUS FRUGIVORUS, the common crow" = *C. frugivorus* Bartr. = *C. Americanus* Aud. Based on the name alone and "exactly parallel," says Dr. Coues, with the case of the raven.

7. "CORVUS FLORIDANUS, pica glandaria minor, the little jay of Florida" = *Cyanocitta Floridana* (Bartr.) Bon. = *Aphelocoma Floridana* (Bartr.) Cab. At page 212 distinguished from *Cyanura cristata*.

8. "GRACULA PURPUREA, the lesser purple jackdaw, or crow blackbird" = *Quiscalus purpureus* (Bartr.) Cass. This rendering is evidently not tenable, since the *Gracula quiscula* of Linnæus (1758), as shown by his description in the Systema Naturæ, refers to this species and not to *Q. major*, though possibly some of the references may. Hence if *quiscula* is to be used for either of the *Quiscali*, it must be used for *purpureus* and not for *major*, although Bartram employed it for *Q. major*, and on this ground Dr. Coues suggests its adoption for that species.[1]

9. "CERTHIA RUFA, little brown variegated creeper" = *C. familiaris*, var. *rufa* (Bartr.) Coues, "with those who separate the bird from the European" = *C. Americana* auct.

10. "CERTHIA PINUS, the pine creeper" = *Dendrœca pinus* (Bartr.) Bd. "The name," says Coues, "is universally attributed to Wilson, but we see here its original source." Are we quite

[1] "GRACULA QUISCULA, the purple jackdaw of the sea-coast" *Bartram.* Dr. Coues says, "The expression 'purple jackdaw of the sea-coast' is perfectly diagnostic, the species being thoroughly maritime and always called jackdaw in the countries it inhabits." It, however, shares the name "purple jackdaw" with *Q. purpureus*, see Catesby and subsequent early writers. "To those to whom," Dr. Coues continues, "such alliterative names as *Sialia sialis*, *Cupidonia cupido*, etc., are unobjectionable, I suggest the propriety of calling this species *Quiscalus quiscula*."

sure? Is it not more likely to be the *Helminthophaga pinus*, which is the "pine creeper" of Catesby, and the *Certhia pinus* of Linnæus, since Bartram often quotes Catesby, even in his list, and many of his trinomials and English names are the same as those of Catesby, and evidently adopted from Catesby.

11. "LUCAR LIVIDUS, apice nigra, the cat bird or chicken bird" = *Lucar Carolinensis* (Bartr.) Coues = *Mimus Carolinensis* auct. Dr. Coues, presuming "apice nigra" was intended to read "vertice nigra," which of course is probable, adopts the name *Lucar*, though "probably meaningless" and looking "like a misprint," for the generic name of the cat bird, as being coequal with *Felivox* of Bonaparte and *Galeoscoptis* of Cabanis, and as equivalent to *Mimus* in case the cat bird and mocking birds are to be placed in the same genus.

12. "MELEAGRIS AMERICANUS, the wild turkey" = *Meleagris gallopavo*, var. *Americana* (Bartr.) Coues. As it is fully described at pages 14 and 83, and binomially named on page 83 as *Meleagris occidentalis*, this, if either of Bartram's names is to be adoped, is the one which, *according to the rule of priority*, *must* be adopted, *M. occidentalis* having the precedence of over two hundred pages in Bartram's work. Hence we have *Meleagris gallopavo* var. *occidentalis* (Bartr.)! The name *occidentalis* was evidently given in allusion to its being an inhabitant of the western world, as he compares it with the *Meleagris* (*Numida meleagris*) of Africa.

13. "CARDUELUS PINUS, the lesser goldfinch" = *Chrysomitris pinus* (Bartr.) Bon. First described by Wilson under the same specific name, which name, as Dr. Coues observes, has been usually attributed to the latter author. Bartram's right to priority rests solely on the Latin and English names above given, which may be *presumed* to apply to *Chrysomitris pinus* auct.

14. "PASSER DOMESTICUS, the little house sparrow or chipping bird" = *Spizella domestica* (Bartr.) Coues = *Spizella socialis* auct. This is another of the lucky cases where the name alone seems to determine the species with probable certainty.

15. "PASSER PALUSTRIS, the reed sparrow" = *Melospiza palustris* (Bartr.) Bd. First described by Wilson under the same specific name, to whom the name has heretofore been attributed, but is now transferred by Dr. Coues to Bartram, because he presumably used the name for a swamp sparrow, and because we chance to have but one!

16. "PASSER AGRESTIS, the little field sparrow" = *Spizella*

agrestis (Bartr.) Coues = *S. pusilla* auct. First described by Wilson under the specific name *pusilla*, unless it be Gmelin's *Motacilla juncorum*, as some have supposed possible. Several of our sparrows would better bear the epithet "little field sparrow" than this; as, for example, *Pooecetes gramineus* and *Coturniculus passerinus*, and also *Passerculus savanna*, unless the latter should be considered too northern for the asterisk in Bartram's list. *Spizella pusilla*, though now known as "field sparrow," is only found in fields bordered with thickets or partly overgrown with bushes.

17. "MOTACILLA DOMESTICA (*regulus rufus*), the house wren" = *Troglodytes domestica* (Bartr.) Coues = *T. aëdon* auct. Without the English name "house wren," "*Motacilla domestica*" would be wholly undeterminable.

18. "MOTACILLA PALUSTRIS (*reg. minor*) the marsh wren" = *Cistothorus palustris* (Bartr.) Bd. First *described* as *palustris* by Wilson, to whom, as Dr. Coues says, this Bartramian name has usually been attributed; but why is not Bartram's *palustris* as likely to be *Cistothorus stellaris* as anything else?

19. "ARDEA MUGITANS, the marsh bittern, or Indian hen" = *Botaurus mugitans* (Bartr.) Coues = *Botaurus lentiginosus* auct. Can the above names be allowed as a basis for priority, "the marsh bittern" being the only really descriptive part?

20. "TANTALUS PICTUS (Ephouskyka Indian), the crying bird, beautifully speckled" = *Aramus pictus* (Bartr.) Coues = *A. giganteus* auct. Elsewhere fully described.

21. "COLYMBUS FLORIDANUS, the great black cormorant of Florida, having a red beak" = *Graculus Floridanus* (Bartr.). First described by Audubon under the same specific name, probably merely by a coincidence. The "red beak" Dr. Coues explains as a lapse of memory for "red gular pouch and lores."

From the foregoing it will be seen how very slight are the claims Bartram's names have to priority over those in current use. Of the twenty-one given above, Nos. 1, 2, 3, 7, 11 (the generic name only), 12 (*occidentalis*, not *Americana*), and 20, — six or seven in all, — are the only ones that, in justice to all parties, can rightfully stand. One (No. 10) has been shown to be almost unquestionably Linnæan, not Bartramian.

In conclusion, I would suggest to the author of the article under review, who seems so zealous in the vindication of a truly sagacious naturalist, the propriety of also claiming for him priority in the discovery of the geographical law of variation in size in North

American mammals, — a law it took naturalists fifty years longer to develop and formulate, — since Bartram repeatedly alludes to the smaller size of animals of the same species in Georgia and Florida than in Pennsylvania, especially the wolves, deer, foxes, "and other animals." At page 216 of his Travels, for instance, after referring to the small size of the horses of Florida, he says, "It is a matter of conjecture and inquiry, whether or not the different soil and situation of the country may have contributed in some measure in forming and establishing the difference in size and other qualities betwixt them. I have observed the horses and other animals in the high hilly country of Carolina, Georgia, Virginia, and all along our shores, are much larger and stronger than those bred in the flat country next the sea-coast; a buckskin of the Upper Creeks and Cherokees will weigh twice as heavy as those of the Siminoles or Lower Creeks, and those bred in the low flat country of Carolina."

THE HARVARD SUMMER SCHOOL OF GEOLOGY.

BY PROFESSOR N. S. SHALER.

THE first session of this, the last to be established of the several schools for summer teaching which have been originated by the officers of Harvard University, held its first session at Cumberland Gap, Kentucky, during the past summer. The design was to give practical field instruction in geology to teachers and others of some training in science and general culture, who might desire to acquire the methods of such work. The Governor of Kentucky having given an invitation to the President of Harvard College to place the school in Kentucky, and having offered the coöperation of the Kentucky Geological Survey, the school was established at Cumberland Gap, within the State of Kentucky but near to the state lines of Tennessee and Virginia. Though remote from the routes of travel, this point offered peculiar advantages for the study of stratigraphic, topographical, and dynamic geology. The structure of the Appalachian mountain system is exceedingly well shown at this point; the section extends from the lower Potsdam sandstone to the middle coal measures, giving about twelve thousand feet of beds within forty miles of distance; a wonderful system of faults of different ages bring these beds to view at many different points and enable the student to observe them under varied conditions; a short distance away, within plain

view, lies the great Unaka chain, where are found the highest points in eastern North America. The rocks are generally rich in fossils, the section, taking it altogether, giving a peculiarly good illustration of the life of the American palæozoic rocks. The subcarboniferous and Upper Cambrian limestones being very massive, afford a remarkable series of caverns, some of great extent and many abounding in human remains.

Despite a season of great and unprecedented rain-fall, nearly thirty inches in two months, there was no serious illness in the camp.

Restrictions were put on the number of students, more applications having been rejected than accepted. The class in attendance numbered thirty-one persons, more than half of whom were teachers engaged in science-instruction in various academies, normal schools and colleges in different parts of the country.

The instruction consisted of lectures and practical work in the field, the latter occupying by far the larger part of the time. The routine of work was about as follows: at six A. M. a lecture and discussion on the last field work; another lecture in the evening, generally on some zoölogical subject. The daylight was used in field-work near camp, except by those who were out on larger excursions; two or three of the excursions, each occupying from two to four days, were made each week; parties of from four to twelve, with one or more instructors, made a foot journey together over a section of the neighboring field. Each party had a wagon or pack mule, according to the country, and an outfit of provisions and camp utensils for rough camping. On its return the party was expected to report the results of its work at one of the evening meetings. Most of the students made great progress in the field-work, some of them being brought to the point of making extended journeys, from which they would bring back well-digested reports, without the guidance of an instructor.

The following gentlemen were engaged in the administration and instruction of the school: Mr. N. S. Shaler, Professor of Palæontology of Harvard University, and Director of the Kentucky Geological Survey; Mr. Walter Faxon, Instructor in Zoölogy of Harvard University; Messrs. Lucian Carr, A. R. Crandall, F. N. Moore, W. B. Page, C. J. Norwood, John H. Talbutt, and John R. Proctor, Assistants in the Kentucky Geological Survey. Professors Safford and Kerr, State Geologists of North Carolina and Tennessee respectively, assisted in the instruction either in the camp or in the field. Professor Jordan, of Northwestern Univer-

sity, Indianapolis, Indiana, gave some instruction in ichthyology. Near the close of the work, in the latter part of August, several parties were organized to afford the students the opportunity of making extended journeys in the direction of their homes. One or these parties made a journey of two weeks and another of four weeks through the mountains of eastern Kentucky and Virginia. Professor Kerr accompanied a party through a part of the mountains of North Carolina.

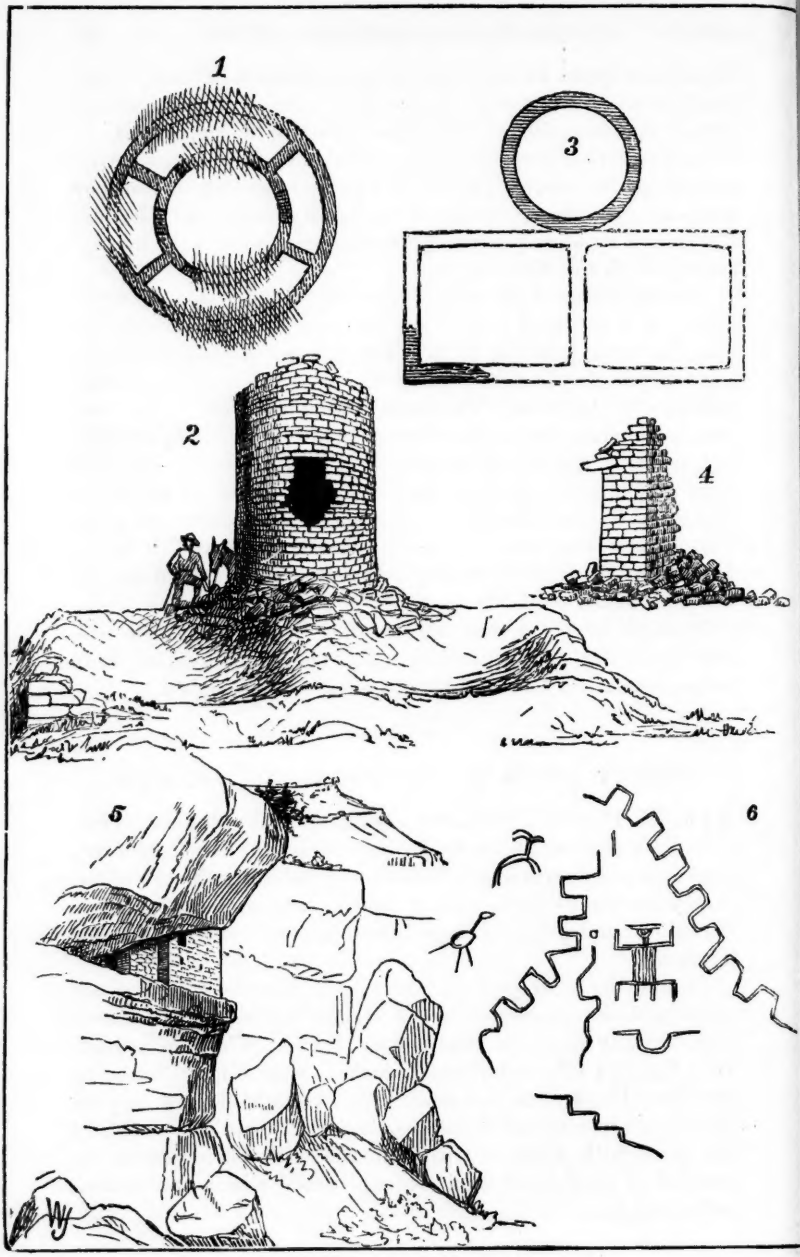
The instruction of the camp began July 1st and closed August 30th. It is proposed to hold the next session of the school at or near the same point, in 1876. The number of students admitted will probably be increased to fifty, and the other conditions will remain the same. The eminent success of the experiment was in the main due to the coöperation of the Kentucky Geological Survey. This survey furnished six skilled persons, who had been trained in the study of the rocks of the State, to the list of teachers. It is satisfactory to note that this assistance was given without any detriment to the researches of the survey, it being found that the students were a help rather than a hindrance to the work of the assistants.

It should be noted that the class was limited to persons who were graduates, or who were actually engaged in teaching or in fitting themselves for the work of professional geologists.

ANCIENT RUINS IN SOUTHWESTERN COLORADO.

MR. W. H. JACKSON, the photographer to Professor Hayden's United States Geological Survey of the Territories, describes and figures in the Bulletin (second series, No. 1) of the survey certain ancient ruins of Indian structures discovered in the valleys and gorges of the extreme southern corner of Colorado Territory.

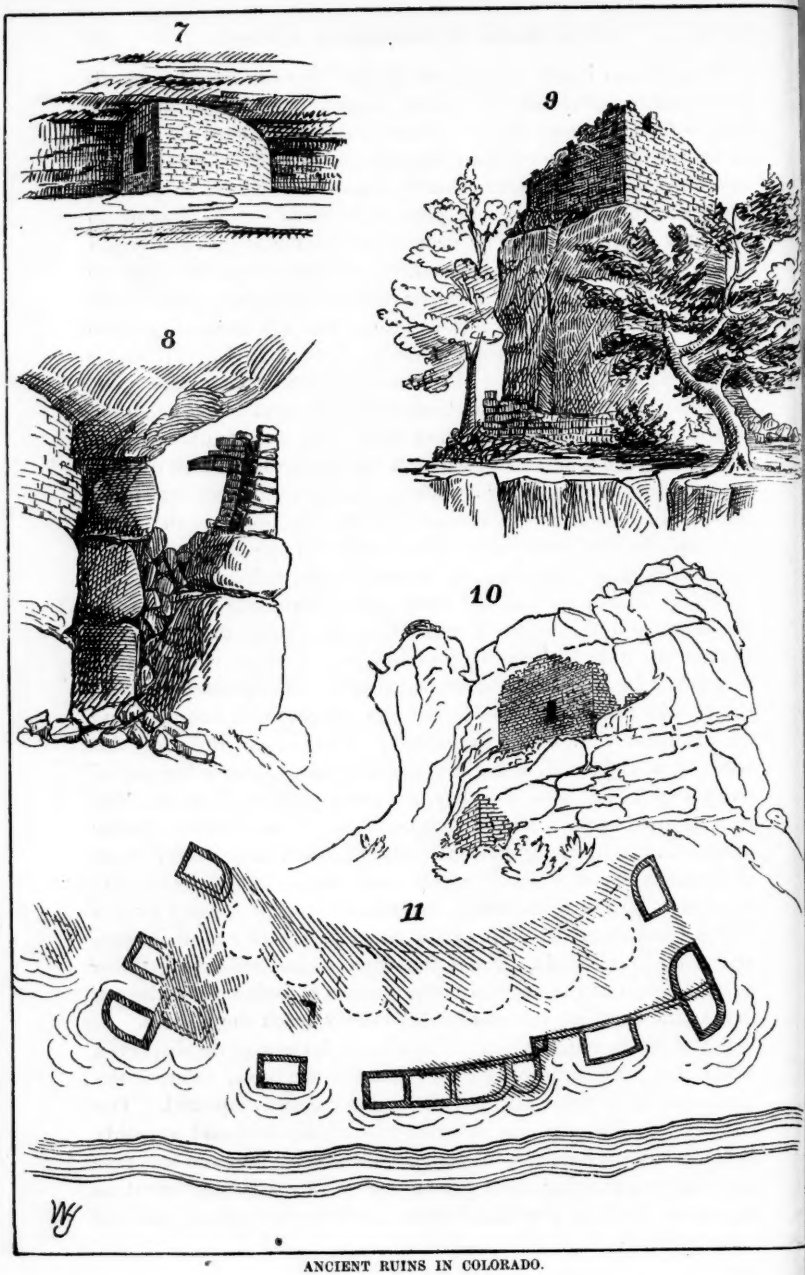
One of the most perfect houses seen was discovered in the crevices of the escarpment of the Mancos Cañon, eight hundred feet vertically above the stream at its bottom. This house (Plate III., Fig. 12; this and plates I. and II. were kindly loaned by Professor Hayden) is two storied, and remarkable, not only on account of its elevated and almost inaccessible position, but from the pains with which it was built, the walls having been constructed of carefully dressed stone, plastered within and painted in two colors.



ANCIENT RUINS IN COLORADO.

"The house itself, perched up in its little crevice like a swallow's nest, consisted of two stories, with a total height of about twelve feet, leaving a space of two or three feet between the top of the walls and the overhanging rock. We could not determine satisfactorily whether any other roof had ever existed or whether the walls ran up higher and joined the rock, but we incline to the first supposition. The ground plan showed a front room about six by nine feet in dimensions, and back of it two smaller ones, the face of the rock forming their back walls. These were each about five by seven feet square. The left hand of the two back rooms projected beyond the front room in an L. The cedar beams, which had divided the house into two floors, were gone, with the exception of a few splintered pieces and ends remaining in the wall, just enough to show what they were made of. We had some little doubt as to whether the back rooms were divided in the same way, nothing remaining to prove the fact excepting holes in the walls, at the same height as the beams in the other portion. In the lower front room were two apertures, one serving as a door and opening out upon the esplanade, about twenty by thirty inches in size, the lower sill twenty-four inches from the floor, and the other a small outlook, about twelve inches square, up near the ceiling, and looking over the whole cañon beneath. In the upper story, a window corresponded in size, shape, and position to the larger one below, both commanding an extended view down the cañon. The upper lintel of this window was of small, straight sticks of cedar, of about the size of one's finger, laid close together, the small stones of the masonry resting upon them. Directly opposite this window was a similar one, as shown in the figure, but opening into a large reservoir, or cistern, the upper walls of which came nearly to the top of the window. It was semicircular, inclosing the angle formed by the wall against the rock, with an approximate capacity of about two and a half hogsheads. From the window and extending down to the bottom of the reservoir was a series of cedar pegs, about a foot apart, enabling the occupants to easily reach the bottom.

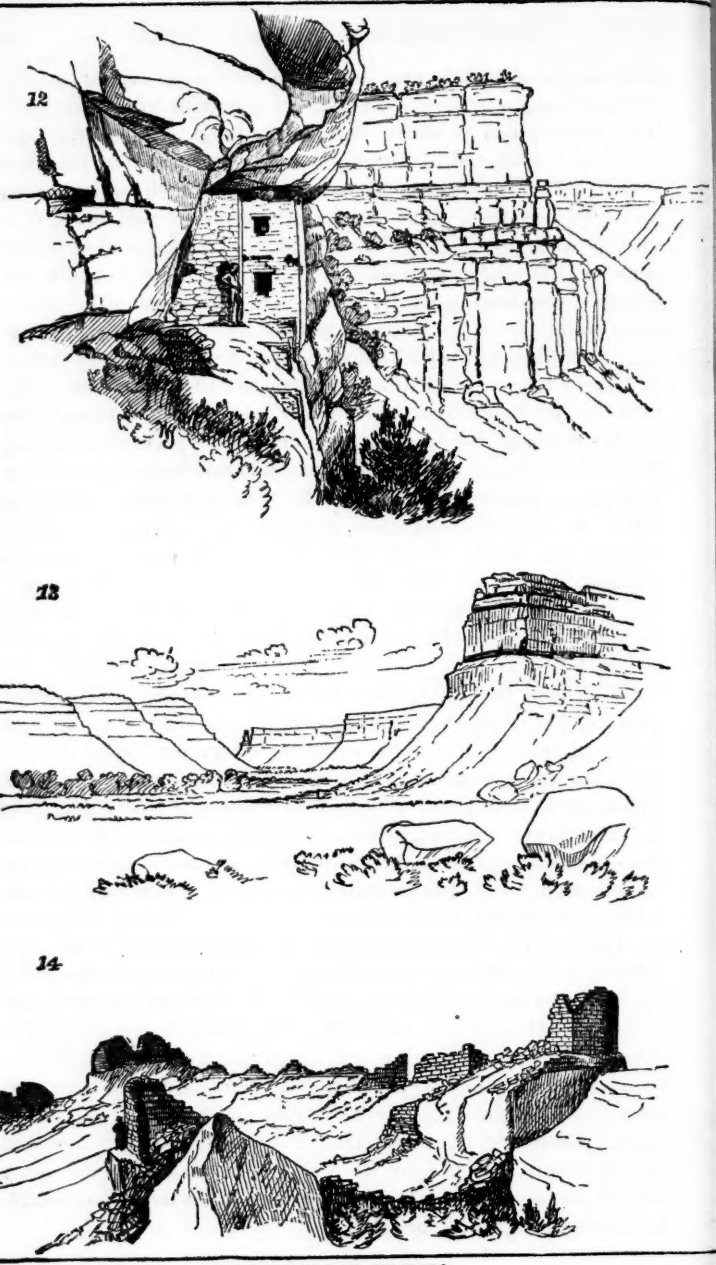
"The entire construction of this little human eyrie displayed wonderful perseverance, ingenuity, and some taste. Perpendiculars were well regarded, and the angles carefully squared. The stones of the outer rooms or front were all squared and smoothly faced, but were not laid in regular courses, as they are not uniform in size, ranging from fifteen inches in length and eight in thickness down to very small ones. About the corners and the



ANCIENT RUINS IN COLORADO.

windows, considerable care and judgment were evident in the overlapping of the joints, so that all was held firmly together. The only sign of weakness was in the bulging outward of the front wall, produced by the giving way or removal of the floor beams. The back portions were built of rough stone, firmly cemented together. The mortar was compact and hard, of a grayish-white, resembling lime mortar, but cracking all over, like some of the adobe mortars. All the interstices between the larger stones were carefully chinked in with small chips of the same material. The partitions were of the same character as the smooth wall outside, both presenting somewhat the appearance of having been rubbed down smooth after they were laid. The apertures from one room to another were small, corresponding in size and position to those outside. Most peculiar, however, was the dressing of the walls of the upper and lower front rooms. Both were plastered with a thin layer of some firm cement, of about an eighth of an inch in thickness, and colored a deep maroon-red, with a dingy white band eight inches in breadth running around the floor, sides, and ceiling. In some places it had peeled away, exposing a smoothly dressed surface of rock. No signs of ornamentation, other than the band alluded to, were visible."

Of some of the other ruins observed in this cañon and photographed, Fig. 1 represents the ground-plan of a round tower, consisting of two circular walls, with the intervening space divided into separate apartments. A tower somewhat larger than usual, adjoining a rectangular structure, is represented by Figs. 2 and 3. The tower was twelve feet in diameter, and at the present time about twenty in height, the wall being some sixteen inches in thickness. Fig. 4 represents a portion of a doorway and one corner of a carefully built house, while Fig. 5 depicts a cliff-house, one hundred feet above the level of the bottom of the cañon, Fig. 6 being a copy of some inscriptions upon the walls of the cañon near by. Another cliff-house, eight hundred feet above the cañon, is represented by Fig. 7, while Fig. 8 indicates the tenacity of the cement, the isolated portion still remaining firmly attached to its foundation. A general view of the cañon of the Rio Mancos near its outlet from the Mesa Verde is given at Fig. 13. The table-lands upon either hand vary from five hundred to one thousand feet in height, and it is in the darkly shaded lines in the upper half of the high bluff on the right that the little houses are found, as shown in Figs. 5, 7, and 12.



ANCIENT RUINS IN COLORADO.

Passing into Utah, Mr. Jackson came upon the ruins of an Indian village (Fig. 14) situated in the bluffs of the valley of the Hovenweep, of which Fig. 11, Plate II., is a ground plan; the area extended a hundred yards.

In the valley of the McElmo, Utah, was found a square tower (Fig. 9) on the summit of an elevated rock. Fig. 10 represents an isolated rock in the same valley, covered with ruined houses and walls. A Moquis tradition states, according to Mr. Ernest Ingersoll, who accompanied Mr. Jackson's party, that at this spot, in ages past, their ancestors made their last stand against the northern tribes before retreating to their present villages.

Over New Mexico and Arizona are scattered similar ruins which have been described since the sixteenth century, when Vaca saw them occupied. The present Moquis Indians inhabit such structures, and it seems probable that their ancestors, an agricultural people, were driven up the cañons by the incursions of hostile tribes from the north.

RECENT LITERATURE.

SACHS'S TEXT-BOOK OF BOTANY.[1] — The present translation is based on the third edition of Sachs's Lehrbuch, a work which has been extraordinarily successful in Germany, a fourth edition having made its appearance during the progress of the English translation. It has also been translated into French by Van Tieghem. The difficult task of rendering technical German words and phrases into clear and forcible English has been very well performed by the translators, and it seems to us that they have shown good taste in making but few annotations, and those explanatory rather than controversial. The text and illustrations are excellent, quite as good as those of the German edition, which is certainly saying a great deal.

The mere fact that the present translation has already been favorably received in England and this country shows that it supplies a want which the ordinary English text-books, excellent as they are in some respects, do not satisfy. This want is a book which shall give something more than a description of the organs of flowering plants, and a detailed account of the orders into which they are divided. It cannot be denied that in this country the tendency has been to consider the chief, if not the only aim of botany to be the classification of phanerogams and the description of new species. The excellent translation of Sachs will, it is to

[1] *Text-Book of Botany, Morphological and Physiological.* By JULIUS SACHS. Translated and annotated by ALFRED W. BENNETT and W. T. THISELTON DYER. Oxford: At the Clarendon Press. London: Macmillan & Co. 1875. $12.50.

be hoped, do much towards correcting this misconception of the true spirit of botany. In the text-book before us only 160 pages are devoted to phanerogams, while the part relating to cryptogams fills 213 pages, and that to physiology a still greater number of pages; so that the reader cannot fail to draw the conclusion that what many botanical students in this country have been in the habit of regarding as the most important thing, is only one branch of the science, and by no means more important than others. Even in that part of the text-book relating to phanerogams there are many ways of looking at familiar subjects which will be new to American botanists, as, for example, the theory of the carpel, and we cannot fail to see that, after all, some things which we have come to regard as facts are nothing but plausible theories, and that other people may have different but equally good theories.

In the fourth edition of the Lehrbuch is a classification of Thallophytes which is given as an appendix to the translation. Sachs rejects the old division into algæ, fungi, and lichens, and, instead, gives a series of parallel groups, those, on one hand, containing chlorophyll and those, on the other, free from chlorophyll. The existence of parallel groups in algæ and fungi has long been known, but we believe this is the first general text-book in which the division into algæ and fungi has been abandoned. Although in a general way correct, the details of Sachs's classification cannot be accepted. Although Sachs is preëminently a physiologist, it seems to us that he has been quite as successful in his presentation of the researches of others in anatomy and cryptogamy, as of his own researches in physiology. We are not made very much wiser by being told that many motions arise from the tension of tissues, and it seems as though the term *reiz*, which may mean either irritation or some inherent attractive force, were only a learned way of concealing ignorance. Throughout the book we are impressed with the fact that advance in botany during later times has been dependent on the use of the compound microscope. Hereafter it will be as impossible for a botanist to keep up with the times without doing microscopic work as for an astronomer to succeed without a telescope.

It is to be regretted that the price of the translation is so high, but the number and quality of the illustrations probably render it necessary. It would be at least a consolation to American purchasers to know exactly what the price is, or ought to be, in this country. We imported the book directly by mail and were obliged to pay $8.60; others have been charged as high as $12, and one, more fortunate, procured a copy at a book store for $8. It has been suggested that the work be divided into parts to be sold separately, and, although students should not read one part to the exclusion of others, many would be able to purchase the separate parts at different times who could not afford to buy the whole at once. An abstract of the translation corresponding to Prantl's abridgment of the German would hardly be advisable, but a translation of Thomé's Lehrbuch der Botanik, would be preferable.

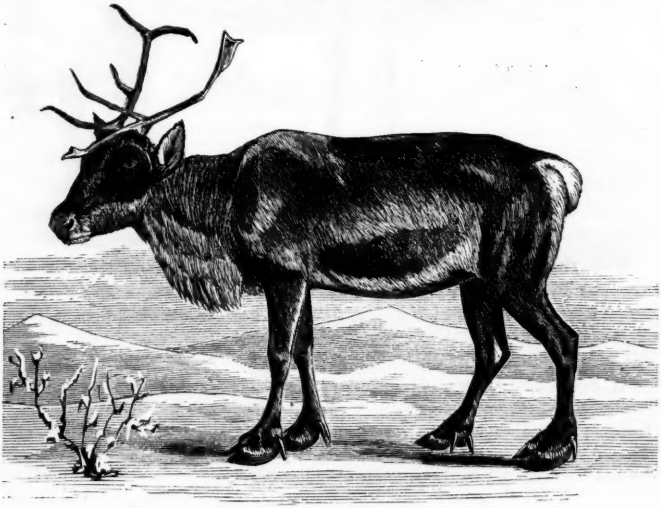
CATON'S SUMMER IN NORWAY.[1] — From a careful reading of this attractive and unpretending book, and from similar experiences in the southern and middle portions of Norway, we feel entitled to say that Judge Caton has given American readers a thoroughly reliable account of Norway, particularly the extreme north. English books about Norway are not so scarce as the author states, but the present volume gives the most complete and accessible general account of this interesting country we have seen. The author lays no claim to a knowledge of geology; the raised beaches and glaciers, on which he does not dwell,

(FIG. 1.) RED DEER OR STAG OF EUROPE.

have been fully described by Forbes in his elaborate work, Norway and its Glaciers, and by Chambers, while the wonderful valleys of

[1] *A Summer in Norway.* With Notes on the Industries, Habits, Customs, and Peculiarities of the People, the History and Institutions of the Country, its Climate, Topography, and Productions. Also an Account of the Red Deer, Reindeer, and Elk. With Portrait and Wood-Cuts. By JOHN DEAN CATON, LL. D. Chicago: Jansen, McClurg, & Co. 1875. 8vo, pp. 401. $2.50.

(Fig. 2.) WILD EUROPEAN REINDEER — MALE.



(Fig. 3.) WILD EUROPEAN REINDEER — FEMALE.

Norway, more like the cañons of the West than any mountain gorges we have seen elsewhere, are not mentioned.

But of the reindeer and Scandinavian elk our author speaks with the interest and decision of an expert, and his opinion on the specific relations of these animals with our caribou and moose should receive due consideration.

(Fig. 4.) SCANDINAVIAN ELK.

The red deer (Fig. 1), now confined in Norway to the two islands of Hatterroen and Smöen, and which in Bohemia has successfully interbred with the American Wapati deer, the author suggests is conspecific with the Wapati or American elk (*Cervus Canadensis*). So also the reindeer (Fig. 2, male, Fig. 3, female) is, we believe, correctly regarded as the same species as our caribou. Judge Caton, in his visit to the Lapps, went among a herd of these timid animals, and had a good opportunity of studying them. He remarks that in size "this deer is less than our woodland caribou, with which it is identical in species, but in Eastern Asia the domesticated reindeer is a much larger and finer animal than in Lapland, and closely resembles in form and development our woodland caribou. There they are used for the saddle by the Tunguses, and highly prized for that purpose,

as we are informed by Erman." Again, on page 238, he says, "During that examination, with the animal so close before me, and made still more critical by handling it, I became entirely convinced of the specific identity of the reindeer of Lapland and the woodland caribou of America, and in this opinion I was only confirmed by a subsequent examination of the wild reindeer of Norway."

The Scandinavian elk was also at one time domesticated, and successfully broken to draw loads, but the experiment was abandoned, while trials made in America, our author tells us, proved that it can be domesticated.

On the southern edge of the Dovre Fjeld he passed by the present habitat in Norway of the elk (Fig. 4), "which is specifically identical with the American moose, though it is a little less in size and not quite so dark in color, but in all essential particulars they are precisely alike, and if one from either side of the Atlantic were transferred to the other, no one would suspect that he was an emigrant."

Of the quality of the illustrations, our readers, through the liberality of the author and his publishers, have an opportunity to judge. They were drawn by an excellent German artist, from animals preserved in captivity, and while standing quietly. In the case of the elk, however we doubt whether the engraver has done justice to the drawing of the artist.

Some unfortunate typographical errors occur, as "Dover-fjeld" for Dovre-fjeld, "Felle Fjeld" for Fille Fjeld, "Romsdel Fjord" for Romsdal Fjord, while in most, if not every case, Christiania is spelled "Christiana."

DICHOGAMY IN PLANTS.[1] — Our readers will recall with pleasure a translation of some of Professor Delpino's notes on this subject printed in this journal, July, 1871.

The present work is far more comprehensive than its modest title indicates. It classifies the insect-visited flowers upon a new basis, namely, with regard to the attractions which they offer insects, and birds as well; it presents, however, an exhaustive statement of the peculiarities of structure which render close-fertilization unlikely. As a mere hint of the method, we will allude to the group of odoriferous blossoms. These flowers are divided into two classes, *sympathic* and *idiopathic*. The former is subdivided into those flowers which are (1) sweet-smelling, (2) aromatic, (3) fruity in odor, like *Calycanthus*. The second class, comprises (4) those with heavy odor (e. g., *Papaver*), and (5) those which are nauseous, as some of the stapelias. But it must be further stated

[1] *Ulteriori Osservazioni sulla Dicogamia nel Regno vegetale*, per FEDERICO DELPINO: parte seconda, pascicolo ii. Milano, 1875.

Later Observations and Considerations respecting Dichogamy in the Vegetable Kingdom. By F. DELPINO. (This volume of 350 pages is an extract from the Proceedings of the Italian Society of Natural Sciences in Milan, vols. xvi., xvii.)

that these five classes are broken up again into forty-five smells, and each smell has a name! The author has, here and there, made a little blunder of an amusing, but not serious character. For instance, our old friend of the bogs, skunk cabbage, figures as *Pothos fœtida*, under the head *odore alliaceo*, and again with the name *Simplocarpus* (sic) *fœtidus* in the monotypic class *odore mefitico;* which is not so bad, after all. The volume is as attractive to entomologists as to botanists; both will find it full of suggestions in regard to examinations of flowers and their visitants; both will complain that a work so full of details should have no index. The table of contents is analytical and full, but does not replace the index which we have the right to expect.

Recent Books and Pamphlets. — The Structure and Development of the Sting and Ovipositor of Certain Hymenoptera and the Green Grasshopper. By Dr. H. Dewitz. 8vo, pp. 26. (From Siebold and Kölliker's Zeitschrift.)

List of the Fishes, Tunicata, Polyzoa, Crustacea, Annulata, Entozoa, Echinodermata, Anthozoa, Hydrozoa, and Sponges known from Greenland. Compiled for the use of the British North-Polar Expedition. By Dr. Chr. F. Lütken. 1875. 8vo, pp. 115 to 197. London.

The Vertebrata of the Cretaceous Formations of the West. By E. D. Cope. United States Geological Survey of the Territories. Washington, D. C., 1875. 4to, pp. 303. With 57 lithographic plates. (For sale by the Naturalist's Agency, Salem, Mass.)

Recherches sur les Phénomènes de la Digestion chez les Insectes. By F. Plateau. Bruxelles. 1874. 4to, pp. 124, 3 plates.

Check List of the Noctuidæ of America North of Mexico. By A. R. Grote. I. Bombyciæ and Noctuelitæ. Buffalo, N. Y. 1875. 8vo, pp. 28, with a plate. (For sale by the Naturalist's Agency, Salem, Mass.)

The American Journal of Microscopy. New York Industrial Publication Co. Vol. I. No. 1. December, 1875. 8vo, pp. 12. Fifty cents a year, single number six cents.

The Illustrated Annual Register of Rural Affairs for 1876. Albany, New York: Luther Tucker and Son. No. 22. 12mo, pp. 134.

Synopsis of the Odonata of America. By Dr. H. A. Hagen. (From the Proceedings of the Boston Soc. Nat. Hist. xviii, 1875.) Boston, 1875. 8vo, pp. 76.

Bulletin of the United States National Museum. No. 1. Check List of North American Batrachia and Reptilia. By Edward D. Cope. (Department of the Interior, U. S. National Museum.) Washington, D. C. 1875. 8vo, pp. 104.

Die Gastrula und die Eifurchung der Thiere. By Ernst Haeckel. (From the Jenaische Zeitschrift, 1875.) With 7 plates. 8vo, pp. 106.

GENERAL NOTES.

BOTANY.[1]

Dichogamy in Epilobium angustifolium. — That the anthers shed their pollen before the stigmas of that flower are in condition to receive it, is one of the observations of Sprengel, at the very beginning of our knowledge of this subject. But he seems not to have called attention to the additional security against close-fertilizing, caused by the recurving of the style during the early anthesis, while the pollen is shed-

[1] Conducted by Prof. G. L. Goodale.

ding, and its erection afterwards so as to bring the now expanded stigmas into the line of the axis of the blossom. Nor does Lubbock allude to anything of the kind. This I shall elsewhere illustrate. The present object is to call attention to a point which I had not observed, but which is mentioned in a letter from a former pupil, Mr. W. M. Courtis; namely, that only seven of the stamens shed their pollen before the stigmas expand, the eighth anther opening afterwards; or in some flowers two anthers are thus late; "as if it might be nature's plan to insure cross-fertilization if possible, but if not, self-fertilization would be possible." This should be looked after next summer. — A. Gray.

Dimorphism in Claytonia. — The number of hermaphrodite flowers in which either dichogamy or dimorphism is known to occur, already large, increases with attentive observation. Mr. E. L. Hankenson, of Newark, New York, finds two forms of *Claytonia Virginica*, and sends copious specimens; one form has an elongated style and short filaments; the other long filaments which equal or overtop the style, the latter, however, not absolutely shorter than in the counterpart form. It would be interesting to know if this holds true generally. — A. Gray.

Cheilanthes Alabamensis. — As ferns are now much sought, it is worth recording that Mr. Walter Faxon last summer discovered this southern species within the limits of Gray's Manual, on Indian Creek at the boundary between Lee County, Virginia, and Claiborne County, Tennessee. — A. Gray.

The Hollyhock Puccinia. — A note in the October Naturalist, by Mr. Meehan, in which he states that *Puccinia malvæsarum* has probably existed in this country for many years, leads me to say that ever since notices in foreign journals, regarding the sudden and wide-spread appearance of this fungus in Europe, have appeared, I have taken more notice than usual of all hollyhocks that I have met with (and the plants are abundant in this country, not only in cultivation but as garden weeds and scapes to roadsides), but have failed to find the *Puccinia*. On several occasions I have found at roadsides hollyhock plants whose leaves were densely covered with brownish spots, and having the same appearance as leaves infested with the *Puccinia* (of which I have many specimens from England and Germany); on examination, however, no fungus was found, but it appeared to me that the spots were of insect origin. If not the work of insects it may be possible that they were due to a species of *Phyllorticta* (*P. destruens* Derm.?) whose perithecia would have appeared later in the season. — W. R. Gerard.

Vitality of Seeds. — H. Hoffmann reviews in the *Botanische Zeitung*, October 15 and 22, 1875, the vexed question of vitality of seeds. After giving references to the literature of the subject, which, by the way, he does not treat at all critically, the author describes experiments with *löss*, a diluvial earth found in the valley of the Rhine. When the railroad station Monsheim (at Worms) was built, the earth was dug away

to a depth of twelve feet. Some of the *löss* was taken with necessary precautions, and securely sealed until the following spring (1865). In May, twenty-four flower pots were half-filled with manure which had been heated in order to destroy any seeds present, and on this substratum some of the *löss* was placed, leaving an air space above, of two inches, and each pot was covered by a glass disk which had a bit of wood under one edge to allow access of air. The surface of the *löss* soon had plenty of ferns and mosses, just like those which are so abundant in all greenhouses. A few phænogamic plants came up; four which could not be determined accurately were supposed to be *Vaccinium myrtillus*, a second, a *Chrysanthemum Leucanthemum;* afterwards a third came up, a *Galium*, and finally an *Equisetum*. A second series of experiments, conducted with greater care to exclude all waifs, gave wholly negative results. Some molds, a coat of moss, and a single grass, *Festuca pratensis*, were the only plants within the bell-jars.

The Primordial Utricle. — Professor Pfeffer has lately studied the so-called primordial utricle, with the following results, which are given in the *Botanische Zeitung*, October 1st, from *Kölnische Zeitung*, 1875, 248. Protoplasm placed in contact with aqueous solutions becomes clothed on all sides with a delicate membrane caused by precipitation. This is the so-called primordial utricle. In protoplasm, certain albuminoids are dissolved, which separate out in water because their solvent is withdrawn. But this is limited to the surface of contact, because the membrane formed by precipitation does not allow the solvent to pass through. What this solvent is, has not been ascertained positively, but it is believed to be something beside the inorganic salts which, in egg-albumin, hold a protein substance in solution.

Origin of high Hydrostatic Pressure in Vegetable Cells. — In the *Botanische Zeitung*, November 5th, there is an abstract of a communication made by Professor Pfeffer to the botanical section of the Association of German Naturalists and Physicians, at Graz, 1875, on the subject of the origin of high hydrostatic pressure in vegetable cells. This pressure, amounting sometimes to several atmospheres, even where there is only slight concentration of the fluid contents of the cells, led him, on theoretical grounds, to refer it to the molecular condition of the primordial utricle. This conclusion was confirmed by experiment. With contraction of the molecular interspaces, resistance to filtration increases, and likewise the pressure which is brought about endosmotically. Thus in the case of the precipitated membrane of ferrocyanide of copper (see Sachs's Text-Book, p. 597) a pressure of two atmospheres can be obtained, provided the film finds a suitable support, in a two per cent. solution of cane sugar. In the brief account given, there are no details as to the method of determining the amount of pressure. The resistance of the membrane to filtration is a complex force dependent on several variables, but with changes in this resistance, hydrostatic pressure is

changed; for instance, by heating, since thus the molecular interspaces are increased. This theory was then ingeniously applied to the explanation of periodic movements in plants.

Botanical Papers in Recent Periodicals. — It is intended to give under this head the titles of the principal papers relating to botany and vegetable physiology, contained in the scientific journals and proceedings of societies. The enumeration will not always be exhaustive, nor will short notes or memoranda be mentioned unless of particular interest. A few of the following titles are at second-hand from Sklarek's *Repertorium der Naturwissenschaften*, October, 1875.

American Journal of Science and Arts, November, 1875. Æstivation and its terminology, by Prof. Asa Gray (gives the history, and discusses the question, of the proper term to be applied to the mode variously called *obvolute*, *contorted*, or *convolute*).

Bulletin of the Torrey Botanical Club, New York, October and November, 1875. Lichens of Kerguelen's Land, by Professor Edward Tuckerman. (Among the species collected by Dr. Kidder in the U. S. Transit Expedition is a new genus, *Urceolina*.) Notes upon *Anychia dichotoma*, by John H. Redfield (suggests the reëstablishment of two species). Dimorphism or trimorphism in *Pontederia cordata*, by W. H. Leggett.

The Journal of Botany, British and Foreign, November, 1875. Descriptions of new plants from the Nicobar Islands, etc., by S. Kurz (giving also a short account of the principal features of the vegetation of this group in the Indian Ocean). New lichens from Kerguelen's Land, by the Rev. J. M. Crombie. Professor Tuckerman's paper in the October number of the Bulletin of the Torrey Club has a month's priority.

Quarterly Journal of Microscopical Science, October, 1875, has two photographs of microscopic preparations of the resting spores of the potato fungus. Mr. W. G. Smith observes that the organisms now photographed are identical with the bodies found thirty years ago by Dr. Rayer, of Paris, and afterwards placed in the hands of Rev. Mr. Berkeley. These specimens are still in existence and have been photographed to the same scale as the recently found bodies. In the same journal Professor McNab gives a condensed translation of Dr. Oscar Brefeld's memoir on the life-history of *Penicillium*, a genus of low fungi to which the common pale blue mold belongs.

Journal of the Linnean Society, October 11th. Notes on the Gamopetalous orders belonging to the Campanulaceous and Oleaceous groups, by George Bentham (dealing with the development of the former group and the geographical distribution of both). Notes on the occurrence of "fairy-rings," by J. H. Gilbert. "The highly nitrogenous fungi flourished strikingly, and appeared in 'fairy-rings' on two plots only," in Mr. Gilbert's experiments. "On neither of these was nitrogen or potass applied as manure." On the characteristic coloring-matters of the red

groups of *Algæ*, by H. C. Sorby. Six different characteristic coloring-matters, soluble in water, have been detected and are here described. The six are referred to two typical coloring-matters, *Phycocyan* and *Phycoerythrin*.

The Gardeners' Chronicle, November 20, 1875. Rue, a popular account of its historical and legendary associations. Autumn tints of trees, by J. McNab. *Garcinia mangostana*, by Mr. Prestoe, of Trinidad (an interesting description, with plates, of the fruit of the mangosteen).

Comptes rendus des Séances de l'Académie des Sciences, September 20, 1875. On the rôle of the protective sheath of the vascular bundles in herbaceous dicotyledons, by J. Vesque. On the development and structure of glands within the leaf, by J. Chatin. September 27th. Abnormal variation of hybrid plants, by Ch. Naudin.

Annales des Sciences Naturelles, Botanique, 1875–1–1. New researches respecting the *Mucorineæ*, by Ph. Van Tieghem. To be hereafter noticed.

Jahrbucher für Wissenchaftl. Botanik, Bd. X., heft 2. On the anatomy of leaves, by Reinke (with special reference to certain glands occurring on them). On the fertilization of *Basidiomycetes*, by Max Reess. Germination of the spores of *Cyathus* (a gastromycetous fungus), by R. Hesse. On the development of certain leaves, by A. B. Frank (treating chiefly of the theory of interposition).

Flora, 1875, No. 22. On growth, and the formation of chlorophyll, by C. Kraus. (The formation of chlorophyll does not retard growth.) No. 23. Abnormal fir-cones, by Döbner. On the action of vegetable acids on chlorophyll within the plant, by C. Kraus. (No effect produced unless the protoplasma and the contained chlorophyll are enfeebled.) No. 26, On abnormal cones, by A. Braun.

Botanische Zeitung, October 1st to November 5th, inclusive. Fertilization of species of *Agaricus*, by Dr. E. Eidam. In reports of societies: *Göttingen*, H. Conwentz shows that the microscopic anatomy of the vascular bundles may be sometimes used as a diagnostic character in ferns. *Bonn:* On the formation of the primordial utricle, by Professor Pfeffer (elsewhere noticed). *Leipsic:* An examination of certain lichens with respect to the Schwendener theory, by G. Winter (favorable to the theory). New *Peronosporeæ*, by Schenk. On certain fungi, by G. Winter. On intercellular thickening in the cellular tissue of ferns, by Luerssen. On flesh-eating plants, by Reess and Will. (Investigations made before the appearance of Mr. Darwin's treatise, and generally confirming his results, by more technical methods of research.) On the origin of high hydrostatic pressure in vegetable cells, by Dr. Pfeffer (elsewhere noticed). On the morphology of vascular cryptogams, by Dr. Frank (comparing them with the lower grades). On the lower limits of sexuality in plants, by Dodel-Port. On fertilization, by Strasburger. On the plants of Ætna, by Professor Strobl. *Brandenburg:*

On the arrangement of the leaflets in ferns and cycads, by A. Braun. (The leaflets in the former have the posterior edge of the one leaf covering the anterior edge of the one behind it; the leaflets in cycads are the reverse of this. There are said to be a few exceptions in ferns.) *Halle:* On the anatomical structure of the roots of certain *Convolvulaceæ*, by Schmitz. (This paper is of pharmaceutical interest, being devoted to the detection of adulterations in drugs of the order, such as jalap.) A contribution to the subject of the vitality of seeds, by H. Hoffmann (elsewhere noticed). Some other notices are unavoidably deferred.

ZOÖLOGY.

The Extinction of the Great Auk at the Funk Islands. — Mr. Michael Carroll, of Bonavista, Newfoundland, has recently given me the following very interesting facts respecting the extermination of the great auk (*Alca impennis*) at the Funk Islands. In early life he was often a visitor to these islands, and a witness of what he here describes. He says these birds were formerly very numerous on the Funk Islands, and forty-five to fifty years ago were hunted for their feathers, soon after which time they were wholly exterminated. As the auks could not fly, the fishermen would surround them in small boats and drive them ashore into pounds previously constructed of stones. The birds were then easily killed, and their feathers removed by immersing the birds in scalding water, which was ready at hand in large kettles set for this purpose. The bodies were used as fuel for boiling the water. This wholesale slaughter, as may well be supposed, soon exterminated these helpless birds, none having been seen there, according to Mr. Carroll, for more than thirty years, and he expresses great doubt in respect to the existence of the species now anywhere about the islands of Newfoundland or Labrador. — J. A. Allen.

Bewick's Wren, *Thyothorus Bewicki*, is something of a rarity, I believe, in the Atlantic States, where its movements, and especially its breeding resorts, are not very well made out. It may, therefore, be worth while to here record the fact that it breeds in considerable numbers in these same mountains. I saw two or three individuals during my ride up and down the mountains; and, though I found no nests, the actions of the birds satisfied me that they were at home for the summer. — Elliott Coues.

Range of the Bay Ibis. — A letter from Captain C. Bendire, U. S. A., to E. Dickinson, Esq., dated Camp Harney, Oregon, says, "I have lately discovered that *Ibis Ordi* breeds near here. An officer has sent me portions of a skin, sufficient for identification, and writes me that he saw the young birds, besides some forty old ones." — Elliott Coues.

Early Nesting of the Anna Humming-Bird. — In the Ornithology of California, i. 359, I stated that the young of *Calypte Anna*

are sometimes hatched as early as March 15th, but never having met with eggs, I was not aware until this year that such is their usual habit near San Francisco. The extensive cultivation of Australian trees may, perhaps, have helped to make this early nesting more general, as in this climate such trees, as well as other subtropical garden plants, are covered with flowers, supplying winter food for these humming-birds more plentifully than the native plants formerly did. But whether a "new departure" or not, my boy (eight) years old) found three nests of this species within a stone's throw of the house, between February 15th and 20th, all on low branches of the Eucalyptus (or Australian blue gum), between ten and twenty feet above the ground. These trees are covered most of the winter with large flowers, in which there is much honey, and the acacias of several species, also blooming at this season (like most *antipodal* trees), have been very attractive to the hummers, as well as to minute insects on which they feed. They have likewise utilized the long, silky stamens of some acacias in building their nests, though still using chiefly the down from various native herbs, the platanus, willow, etc., besides going a long distance to find lichens to adorn the nests outside, although there are none of these parasites on their favorite gum-trees.

I have since seen another nest built on a densely-leaved twig of a Monterey cypress, adding to the variety of locations before described, and this was a few yards only from a noisy hotel on the main road. To add to the completeness of their history I watched one nest to note time of incubation, and found it sixteen or eighteen days *at least* [while the Eastern species needs but thirteen. — *Brewer*]. One brood was hatched before March 1st, another on the 5th. This is while only two truly summer visitors have arrived, the *Hirundo bicolor* (January 30th) and *Selasphorus rufus*, the latter (Nootka hummer) first seen February 16th, but does not build until April or May.

In the nest observed, one young died, but the other was fledged and left it on March 30th, quite able to make short excursions for food in fifteen days. I had seen fledged young ones about the Eucalyptus trees several days earlier, so that they must hatch in many nests as early as March 1st. Three cold rains occurred during the development of the one I watched. During all the time of development both of eggs and young there have been white frosts at night and fresh, piercing cold winds during the day. As with the Nootka Hummers the females perform the task of hatching and feeding the young entirely by themselves, the males disappearing from the lowlands and gardens after the eggs are laid, and retiring among the richer flowers of the mountain cañons.

My correction of Nuttall's account of the nest of this species is confirmed by these specimens, which are much larger than that he describes, being 1.75 inch, instead of 1.25 wide, etc. But as he caught the female on the nest, with the eggs in it, and describes the bird (as *Trochilus icte-*

rocephalus), at the same time stating that it is the one mentioned by Audubon as the female of the Anna, he must have made an error in measuring it, especially as he gives the height correctly. His specimen, by the way, is mentioned by Baird and others as a "*male* with forehead covered with yellow pollen." This mistake may arise from its having a red metallic patch on the throat, not mentioned in their descriptions of the female, but I can state from seeing hundreds of females in spring, that they *have* this patch as well as young males in fall. The female Nootka hummer has it also, as late authors state, though Nuttall was doubtful about it.

I may add that the only other small bird yet building here is the bluebird (*Sialia Mexicana*), and this only inside of buildings or hollow trees. — J. G. Cooper, Haywood, Alameda County, Cal.

Intelligence in the Hawk Moth. — While watching the sudden unfolding of the flowers of the *Œnothera Lamarkiana*, we observed that the hawk moths never visited the same flowers twice, even when frightened away by some motion made by us. On returning, they would go only to those flowers that had opened during their absence, or that had not been visited before their flight. — J. M. Milligan.

Perforation of Orange Skins by Moths. — The proboscis of Australian moths of the genus *Ophideres* is said to be so stiff, and even barbed, that it is capable of perforating the most resisting envelopes. The moths thus perforate oranges in order to feed upon their juices. M. Künckel has examined the specimens forwarded to him by M. Thozet, a French botanist, and says, "It is incorrect to call the proboscis rigid, as it curls up in the usual way; but instead of a soft terminal portion, it has a hard one. The two adpressed maxillæ terminate in a sharp triangular point, furnished with two barbs. They then swell out and present on the lower surface three parts of the thread of a screw, while their sides on the upper surface are covered with short spines springing from a depression with sharp, hard sides. These spines are to tear the cells and the pulp of the oranges, as a rasp opens those of beet root, to extract the sugar. The upper portion of the proboscis is covered from below and on the sides with fine serrated striæ disposed in a half helix, which give it the qualities of a file. These striæ are from time to time interrupted by small non-resisting spines, which serve as tactile organs. The orifice of the canal by which the liquids ascend is situated on the lower face, below the first thread of the screw.

"Not content with examining *Ophideres Fullonica*, I studied *O. salaminia*, *O. materna*, and *O. imperator*, which all had auger-like probosces. The structure of these maxillæ affords a generic character of great value; it moreover establishes a closer relation between the lepidopters, the hemipters, and certain dipters which have maxillæ adapted to pierce tissues." — *Monthly Microscopical Journal*, London.

The European Tree Sparrow in the United States. — It will

interest ornithologists to know that the tree sparrow of Europe (*Pyrgita montana*) has lately been discovered to be a resident of the United States.

The resemblance of this species to the English house sparrow has led me to be on the watch for it since the introduction of the latter, but without success until I found it in St. Louis, Mo., last spring. Here I found the new species abundant, but was unwilling to take any until the breeding season was over. Four skins sent to Mr. G. N. Lawrence, of New York, are pronounced by him to "agree accurately with the plate and description of this species." He also informs me that about five years ago Mr. Eugene Schieffelin noticed fifty or sixty of these birds in the store of a bird importer in New York, where they were unrecognized; and these were probably afterwards sold as or with *P. domestica*. This is undoubtedly the explanation of their occurrence here, and further search will very likely show their presence in other localities.

With a general resemblance to the common house sparrow, *Pyrgita montana* is readily distinguished by its chestnut crown and the similarity of both sexes and the young. In St. Louis it considerably outnumbers *P. domestica*, and, as is the case in Europe, it prefers the outskirts of the city and the country. In other respects these two species closely resemble each other. — Dr. James C. Merrill, U. S. Army.

ANTHROPOLOGY.

Antiquity of Man. — Mr. Southall, in his late work on the Recent Origin of Man, founds an argument against the antiquity of man's origin in the fact that what are unquestionably paleolithic implements are occasionally found on the surface of the ground, either alone or associated with neolithic or polished stone implements. There are two reasons why such a commingling of the two forms does not militate against this division of an unquestioned stone age. It should be remembered, in the first place, that paleolithic implements, after being long buried in strata of sand or gravel, may become exposed by floods, landslides, or through ice-action, as when an ice-gorge causes a river to cut for itself a new channel, thereby sweeping away the soil over a considerable belt of country. Subsequently, the river resumes its older channel, and the newer implements in time are dropped and so mingled with the exposed older forms. From what I have seen of the action of the Delaware River along its valley, especially between the cities of Trenton and Bordentown, in New Jersey, I have satisfied myself that such may have occasionally been the case during the occupancy of this neighborhood by the Indians. Secondly, if the Indians were the first and only inhabitants of the Atlantic coast of America, prior to the arrival of the Europeans, it is quite certain that they were a paleolithic people when they reached these shores, and whatever may have been the geological changes subsequently, they maintained their ground, and very gradually learned to

utilize the more difficultly wrought minerals in fabricating stone implements, and thereby reached the polished stone period. In this way, the two forms would be necessarily mingled; but it must be remembered that as a rule the two forms *are not associated.* Where one paleolithic implement is found upon the surface, a hundred are quite deeply imbedded in the soil, and in the underlying gravels. — CHARLES C. ABBOTT, M. D.

INDIAN GRAVES IN NEW JERSEY. — The graves of Indians found here in central New Jersey vary to a considerable degree, and suggest the probability that tribes having different burial customs successively occupied this territory. On the terrace that faces the east side of the Delaware River, below Trenton, where I have gathered thousands of stone implements, the graves are to be detected by the discoloration of the soil and the little series of relics that were deposited in each grave. These graves, now a foot or more deep, were in all probability "surface burials," *i. e.*, the body, encased in skins and covered with bark, was placed *on*, not *in*, the ground. In time the grave would become covered with leaves and sand, and so gradually be covered with a thin layer of vegetable mold and earth. The gradual increase in the depth of the soil, which is ever in progress in wooded countries, would result in making the surface burial really an inhumation, and as such we now find it. This shallow grave, with every vestige of the skeleton long since gone, and simply indicated by a few arrow-points, an ax, and possibly a pipe, bears every indication of antiquity, and yet doubtless is simply the grave of an Indian. There is one feature connected with these graves and the scattered relics, as we find them, that deserves attention. The rude implements, never polished, and made of the river rock, which we have maintained were strictly paleolithic implements, are never found in these graves, or in any graves that we have examined. Had these ruder implements been used as a general thing, at the same time that the polished celt and jasper arrowheads were made, then they would likewise have been deposited in the graves; for the contents of an Indian grave are the implements and ornaments the occupant used and wore during his life-time. Like the implements themselves, these graves are proofs of the great antiquity of man's origin along the Atlantic coast of America. — CHARLES C. ABBOTT, M. D.

GEOLOGY AND PALÆONTOLOGY.

COMSTOCK'S GEOLOGY OF WYOMING. — This report is to be found in Captain Jones's Report upon the Reconnaissance of Northwestern Wyoming including Yellowstone National Park, made in the Summer of 1873. The portion by Prof. Theo. B. Comstock relates to the structural geology of the country passed over, and contains new matter regarding the celebrated hot springs and geysers of the Yellowstone Park, with archæological and philological notes relating to the Indian

tribes, particularly the Shoshones. The report is accompanied by a large colored geological map. We hope hereafter to print some extracts concerning the geysers and Indian inscriptions.

Cope's Cretaceous Vertebrates. — This elaborate and lavishly illustrated quarto volume, issued as one of the final reports of Hayden's Survey, forms a worthy successor to the palæontological monographs of Leidy and Lesquereux, also published by Hayden's United States Geological Survey of the Territories.

Scudder's Fossil Butterflies is another exquisitely printed and illustrated monograph of a high order of merit, on a subject quite novel and as interesting to European students as to home observers. We shall return to these works in subsequent numbers.

Hyatt's Fossil Ammonites, with the works previously cited, witness the activity now shown by American palæontologists. Several papers by Professor Hyatt have been issued during the past year, giving the results in brief of the studies of many years on the supposed genetic relations and classification of different groups of Ammonites. Of much interest in connection with the hypothesis of evolution are the papers entitled Biological Relations of the Jurassic Ammonites, and Genetic Relations of the Angulatidæ. An elaborate monograph by Professor Hyatt of certain groups of Ammonites, particularly the *Arietidæ*, to be illustrated by a number of plates, is to be soon published by the Museum of Comparative Zoölogy.

Winchell's Geology of the Black Hills forms the geological report appended to Captain Ludlow's (U. S. Engineers) Reconnaissance of the Black Hills of Dakota, 1874, but only lately published. The report fills fifty-five quarto pages, embracing also a list of trees and shrubs, and is accompanied by a colored geological map of the route surveyed.

Kerr's Geology of North Carolina. — Last of all is laid upon our table Prof. W. C. Kerr's Report of the Geological Survey of North Carolina, Vol. I., Raleigh, 1875, containing Physical Geography and Economical Geology, with maps and lithographic plates of fossils, described by Messrs. Conrad and Cope.

The Fossil Plants of America. — Already the study of the North American fossil plants has supplied, in regard to the distribution of the species at different periods, some important information, which modifies a few of the conclusions derived from European vegetable palæontology. Though the isothermal zones have been evidently of a width proportionate to the age of the geological periods, producing in the Carboniferous times, for example, uniformity of vegetation over the whole northern hemisphere, if not over the whole surface of the earth, it appears that there was already at this period a continental or local facies marked in the groups of vegetation. The North American character is recognized in the coal flora of this continent by Schimper, in his

Vegetable Palæontology, as it has been for a long time exposed by the works and descriptions of American authors, and this facies becomes more and more distinct in the more recent periods. The precedence of vegetable types in the geological flora of this continent is distinctly recognized, and therefore the hypothesis of the derivation of the North American flora from Miocene European types is necessarily set aside. On this last question, former remarks in this paper prove the unity of the present flora, derived by constant succession of related vegetable forms from the Cretaceous, at least. On the question of precedence of vegetable types, it has been remarked that the appearance of land-plants is positively recognized in the Silurian of Michigan, while no land-plants have as yet been described from formations lower than the Middle Devonian of Europe; that also we find already in the Devonian of the United States trunks of conifers recognized as prototypes of the *Araucaria*, which are only found later, in the Subcarboniferous of Europe. Our Carboniferous flora has a number of its forms appearing later in the Permian of Europe. The Triassic flora of Virginia and North Carolina is half Jurassic. A number of Cretaceous genera of the Dakota group are reproduced in the Miocene of Europe, as they are, too, in some of the North American Tertiary vegetable groups, and also in the flora of this epoch. Therefore the vegetation of the European Miocene seems partly referable to the American Cretaceous. And in following the comparison upward, we find, in what is considered the Eocene of the Lignitic of the Rocky Mountains, a larger number of forms identical or closely allied to European Miocene species, while the Miocene group of Carbon represents the youngest type of the Tertiary flora of Europe and Greenland, with species of *Platanus*, *Acer*, etc., scarcely distinguishable from indigenous species of our present flora. — *Lesquereux's Review of the Fossil Flora of North America.* (Bulletin of Hayden's Survey of the Territories, second series, No. 5, November, 1875.)

Fossil Vertebrates of New Mexico. — Professor Cope, in a preliminary report to Lieutenant Wheeler, in charge of the United States Geographical Survey west of the one hundredth meridian, enumerates eighty-three species of vertebrate animals as having been discovered by him in the deposits of the Eocene lake that once covered the northern and western parts of New Mexico. Of these, eight are fishes, twenty-four reptiles, and fifty-one mammals. Of the whole number, fifty-four species were introduced for the first time to the notice of scientists. This fauna is nearly related to that of the Eocene of Wyoming in many respects, but differs in the different distribution of many of the genera. Thus, *Palæosyops*, a genus abundant in Wyoming, is not found in New Mexico, while *Bathmodon*, which does not occur in the Bridger beds of Wyoming, is the most abundant type in New Mexico, parts of over one hundred and fifty individuals belonging to seven species having been found by Professor Cope. Small tapiroid animals of the genus *Ovohip-*

pus are abundant, and at least eleven species of lemurine monkeys were found. The carnivorous animals discovered numbered eleven species, some of which were as large as the jaguar, or larger. They are all quite distinct from living genera excepting one genus, which is related to the Asiatic civets. Some very small insectivora were also found, one of which is not larger than a small shrew. The waters of the lake abounded in turtles, crocodiles, and gar-fishes.

GEOGRAPHY AND EXPLORATION.

Wheeler's Reconnaissance of Southern Nevada. — This expedition spent six months in exploring southern and southwestern Nevada in 1869; the results, however, were not published until 1875. The report contains much new information regarding the Indian tribes and southern Mormon settlements. The chief geographical point of interest is the erasing of Preuss Lake from the maps, which was in 1872 found by Lieutenant Wheeler to be the southern shore of Sevier Lake.

African Travel. — An expedition to Central Africa up the Congo River, under Dr. Güssfeldt, failed to accomplish its object owing to the fact that the natives are poor carriers, and were in dread of meeting cannibals in the interior, as well as from the ill-health of Dr. Gussfeldt. Valuable collections were made, however.

The Pacific Coast of America. — Mr. A. L. Pinart, so well known for his researches in Alaska, partly in connection with Dr. W. H. Dall, has received a commission from the French government authorizing him to study the ethnology and languages of the southern races of the west coast of both North and South America. He is at present on a visit to the Indian reservations of Maine and Nova Scotia. Returning thence to San Francisco, he intends to sail for Valparaiso, with a view of determining if possible, besides other things, the source and direction of migration of the native American tribes of both hemispheres.

The Himalayas and their Glaciers. — In Drew's late book, The Jummoo and Kashmir Territories, which is highly spoken of by *Nature*, much is said about the glaciers of the Himalayas; glaciers on a scale, as he says, not to be met with except in the Arctic regions. A glacier which he examined at Basha, in Baltistan, was upwards of twenty miles long, and others are to be met with of much greater extent; indeed to judge from the map, this northwest Himalayan region is one huge net-work of glaciers. The largest of all is the Baltoro glacier, thirty-five miles long, which comes down between two lofty ridges; the northern ridges rise in one spot to the height of 28,265 feet, the peak of that height being the second highest mountain known in the world. And yet, adds *Nature*, these glaciers are a mere remnant, the evidence seems to show, of the glacial covering which at one time spread over the Himalayan region.

Nordenskiöld's Arctic Expedition intends in part to sail up the

Jenesej River with the view of returning to Europe across Siberia, while the other party returns to Norway by sea in the Pröven. The results are exceedingly rich, geographically, geologically, and in a zoölogical way. The Sea of Kara was found to be completely free of ice, and was thus crossed and dredged for the first time by a scientific expedition. The water at the surface of the Kara was so fresh as to kill the animals brought up from the bottom. The investigations on the ocean currents are of much interest. If, says the account in *Nature*, in the northern part of the Sea of Kara, where the water on the surface is almost completely *free of salt*, and at this time of the year very warm, a flask filled with water from the surface is sunk to a depth of ten fathoms, the water freezes to ice. There are thus no warm ocean currents here at any considerable depth below the surface. On the 8th of August the party landed on the peninsula of Jalmal, which separates the Sea of Kara from the Bay of Obi. Here traces of men, some of whom had gone barefoot, and of Samoyede sledges, were visible on the beach. Close to the shore was found a sacrificial altar, consisting of about fifty skulls of the white bear and walrus, with reindeer bones, etc., laid in a heap. In the middle of the heap of bones there stood, raised up, two idols, roughly hewn from driftwood roots, newly besmeared in the eyes and mouth with blood, also two poles provided with hooks, from which hung bones of the reindeer and bear. Close by was a fire-place and a heap of reindeer bones, the latter clearly a remnant of a sacrificial meal.

Arctic Stations. — Lieutenant Weyprecht has surprised geographers by his common-sense suggestion that hereafter Arctic explorers should aim to erect stations at different points in the Arctic regions where observers should make simultaneous observations, extending over the period of a whole year, with identical instruments and according to identical rules, giving their first attention to physics, meteorology, biology, and geology, and the second place to geographical discoveries. Accordingly, the German Commission on Arctic Explorations has recommended that a principal station be established on the east coast of Greenland, with secondary stations on Jan Meyer Island and the west coast of Spitzbergen.

MICROSCOPY.[1]

A Double Staining with Hæmatoxylin and Aniline. — When engaged last autumn in the Anatomical Department of the Oxford University Museum in making microscopic preparations of brain, my attention was especially directed to the staining of the sections.

My first attempts were made with hæmatoxylin and carmine. Of these the latter proved useful for detecting nuclei, but, the protoplasm of the cells remaining almost uncolored, it was impossible to distinguish the shape of the different cells, a matter of the greatest importance where, as in the

[1] This department is conducted by Dr. R. H. Ward, Troy, N. Y.

brain, cells are met with of such various shapes and sizes. Another great deficiency in the carmine-stained sections was the indistinctness of the fibres. In all cases a long time was required for the carmine to take any effect, sixty to seventy hours being insufficient to stain deeply.

Hæmatoxylin produced much more successful results. In the first place, the fibres were almost always brought out distinctly; and secondly, the cells with their processes were in many cases clearly defined. But still the cortical substance was frequently insufficiently stained, even after twenty-four hours' immersion in the staining fluid, which, owing to the use of alum, is sufficient to render the preparations too brittle to be easily mounted. The special value of hæmatoxylin consists in the clearness with which it brings out the nuclei of the medullary substance, and the fibres and cell-processes of the cortical substance; its fault is a want of depth in the color of the cortical substance.

Having found aniline blue useful for staining some hardened tissues, I was led to try it in this case. The only virtue that it had was that it stained the protoplasm of the medullary cells very darkly, and always attacked them first; that is to say, its strongest point exactly agreed with the weakest point in hæmatoxylin.

This led me to double staining, and the results were fully up to my expectations. The following is the method of staining which I finally adopted. After from twenty to twenty-four hours' immersion in hæmatoxylin I washed the preparation in weak spirit, and then in distilled water till all the spirit was driven out. I then immersed it in aniline for from half to three quarters of a minute, again washed it in spirit, and after the usual treatment mounted it in Dammar.

The preparation of hæmatoxylin used was that recommended by Frey, *i. e.*, a few drops of an alcoholic solution of the pure crystals added to a solution of alum in water. The latter I have used in the proportion of from two to four grains of alum to an ounce of water. The more alum there is in the solution the more rapid is the staining, but there is great danger of making a thin section too brittle by the use of much alum. The aniline I diluted sufficiently to be able to see through it pretty easily.

The results obtained by this method are most satisfactory. The nuclei already stained by the hæmatoxylin are made of a richer color, while the protoplasm surrounding them is much bluer than the nuclei themselves. In the cerebellum the effect is particularly good, the medullary substance being of a rich purple and the cortical substance of a pale blue, but showing the cells with remarkable clearness. — W. H. Poole, in Quart. Journ. Mic. Science.

Use of Carbolic Acid in Mounting. — Mr. T. Barnard, of Kew, Melbourne, communicates to *Science Gossip* a reassertion of the successful use of carbolic acid as a substitute for turpentine in mounting insect dissections. A portion of the insect, fresh, is washed, soaked for a few hours in pure carbolic acid, and then mounted in Canada balsam with

better effect than from turpentine. By the aid of heat the mounting can be accomplished almost immediately. Zoöphytes, after boiling in water to remove the air, can be successfully mounted in the same manner, being transparent and flexible, instead of brittle as by the ordinary turpentine process.

Eccentric Pith of Climbing Plants. — Mr. J. B. Hyatt of Morrisania, exhibited at a meeting of the Torrey Botanical Club a microscopic specimen consisting of a section of the stem of poison ivy, *Rhus Toxicodendron* L., and having the pith near one side "like a hole bored near the edge of a coin." A similar structure is seen in some other climbing stems, as of *Ampelopsis*, though not in all such; and the editor of the Bulletin suggests, as a mere conjecture, that the extraordinary one-sided thickening may indicate that the plant is nourished by the rootlets imbedded in the bark of the tree.

SCIENTIFIC NEWS.

— The Department of the Interior has issued a circular, prepared by Professor Otis T. Mason, designed to direct the attention of the agents of the Indian Bureau and others to the collection of objects and information for the purpose of representing at the Centennial Exposition the history of culture among the aborigines of America, including the tribes now in existence and those which are nearly or quite extinct.

— We regret exceedingly to hear of the untimely death of Dr. Willemöes Sühm, the amiable and accomplished naturalist of the Challenger party. He was a student and assistant of Professor Siebold, of Munich, when invited to accompany Professor Wyville Thompson. American naturalists may remember his cordial and hospitable spirit. He was a special student of the lower worms and the crustacea.

— At the opening meeting of the Royal Geographical Society, November 15th, Sir H. Rawlinson referred with great satisfaction to Stanley's exploration of the Nyanza, and exhibited a complete chart of the lake, drawn by Stanley.

— Dr. Francisco Todaro from his studies on the tunicate, Salpa, declares that it has an amnion, and is developed in a true uterus.

— A suggestive article entitled Consciousness in Evolution, by Professor Cope, has been reprinted from the *Penn Monthly* for August.

— Science Teaching to Young Children, in *Nature* for November 18th, gives many useful hints on this topic. We doubt, however, whether entomology is rather a "holiday than a school subject," as it seems to us that it can be taught with as much ease and profit as even botany.

— In American Geological Surveys, by Professor Geikie, in *Nature* for November 4th, he speaks in a flattering way of Hayden's U. S. Geological Survey of the Territories.

— Apropos of surveys, we trust that the friends of science and higher education in Massachusetts will vigorously urge the importance of a re-survey of the geology and biology of that State. The vote in the legislature last year was so decidedly in its favor that it would seem as if a second hearing and renewed effort on the part of men of culture might bring about the accomplishment of the plan urged last winter upon the attention of the legislature, and which came so near to definite and favorable action.

— Dr. Burmeister, of Buenos Ayres, is preparing for the Centennial Exposition at Philadelphia a work on the fossil horse of the Argentine Republic, to be published in large folio with eight plates. He is also just sending to press the first volume of his Physical Description of the Argentine Republic.

— The Boston Society of Natural History proposes to send to the Centennial Exhibition an epitome of its museum, including plans of the building and cases. For this purpose fifteen cases, occupying one hundred and five feet of linear measure, will be needed. Besides this, a selected portion of the New England collection, now an attractive feature of the museum, will be placed on exhibition. It is estimated that this portion could be completely illustrated with selections occupying twelve cases, extending eighty-four feet. Work has already begun under the direction of Professor Hyatt, the custodian.

— The *Monthly Weather Review* of the Weather Signal Bureau at Washington, with its maps and quite full record of biological phenomena, will interest students and prove after a series of years of very considerable scientific value. With little effort more contributors might perhaps be enlisted, so that the connection of meteorological phenomena and the sudden appearance of swarms of grasshoppers, for example, could be traced, and possibly insect years be predicted, and thus farmers warned a year in advance of devastations by insects.

— An excellent article on the wild grasses of Nebraska, by Professor Samuel Aughey, appears in the *New York Tribune* for November 26th.

— An elaborate quarto work on the amphipod crustacea (*Gammaridæ*) of the Sea of Baikal, by Dr. Dybowsky, illustrated by fourteen plates (in part colored), has lately been published by the Entomological Society of St. Petersburg.

— A retriever dog, says *Nature*, whose owner was working in the garden of the Bath Institution, lately killed a favorite cat, a frequenter of the same grounds. Having committed this unprovoked murder, the dog deliberately took the cat in his mouth, carried it some distance, dug a deep hole behind some bushes, and, after depositing the cat therein, carefully replaced the earth; and had he not been observed there would have been no evidence of the crime. Shortly after, the dog lost his life by poison, probably a penalty for the offense.

Had the dog lived, would he not, *more canino*, have exhumed the cat for dietetic purposes? — Ed. Naturalist.

PROCEEDINGS OF SOCIETIES.

PHILOSOPHICAL SOCIETY OF WASHINGTON, November 20, 1875. — Dr. Woodward, of the Army Medical Museum, gave an account, illustrated by photographs and illuminated photographic pictures thrown upon a screen, of spurious lines, noted by Dippel, and more lately in a British periodical, as genuine, seen on certain diatoms. The species *Frustularia Saxonica* has transverse lines of extreme fineness, and longitudinal lines had been described by Dippel and others, some asserting that the latter were coarser and others that they were finer than the transverse ones. Dr. Woodward showed very clearly by his illuminated slides, enlarged on the screen forty-five thousand diameters, that the longitudinal lines appeared not only on the diatom but also on the space external to it, and similar lines appeared about specks of dirt on the plate. These could be varied in coarseness by different illuminations of the object. Hence he concluded that they were spurious, and caused by diffraction of light from the midriff, or the edge of the diatom, or any other object in the field. He remarked that the existence of real lines could be determined by the fact that they did not vary in number under varying illuminations or focusing; they were either seen uniformly, or not seen at all.

December 4, 1875. Professor Henry read a short account of some peculiarities of partial loss of vision in circumscribed portions of the retina, which Dr. Woodward explained by a congestion of one, or a part of one, of the *tuberculæ quadrigeminæ* of the optic nerves.

Mr. J. K. Gilbert read a paper on ripple marks as observed by him in the Geological Survey of the Territories under Major Powell. He concluded that the sharper edges of the ripple marks were frequently, if not always, the upper edges, and suggested that the theory of ripple marks as uniformly connected with littoral action did not explain the facts sufficiently. He supposed that they might be formed in deep water by transmission of vibrations through the water acting on the material at the bottom. Professor Henry said, that while it was evident that ripple marks were of different kinds, yet that he considered it certain that their formation was always the result of motion, either of air or water. Major Powell contended for the formation of ripple marks at the bottom of comparatively deep water in which no current existed. Professor Abbe mentioned the observations of an Italian who had come to the conclusion that motion capable of producing ripple marks might be propagated even to the depth of over one hundred fathoms.

AMERICAN ACADEMY OF ARTS AND SCIENCES, Boston, November 9. — Mr. Sereno Watson presented a paper on a collection of plants recently made by Dr. E. Palmer, in Guadalupe Island, off Lower California. It was found to contain one hundred and nineteen species, in-

cluding twenty-one belonging to the higher cryptogamic orders, besides a dozen of probably recent introduction. The number of new species is twenty-two, with two new genera, almost all nearly allied to Californian species and genera. Of those before known, all are Californian, and most have a wide range through that State. The flora of Mexico is scarcely represented, but on the other hand some fresh indications are found of a connection between our western flora and that of South America.

Boston Society of Natural History. — November 17th. Mr. W. K. Brooks read a paper on the egg and bud development of *Salpa spinosa* (Otto). The life-history of *Salpa* may be stated in outline as follows: the solitary *Salpa* is the female, which produces a chain of males by budding, discharging an egg into each before birth. These eggs are impregnated while the zoöids of the chain are small and sexually immature, and develop into females, which give rise to other males by budding. After the embryo has been discharged from the body of the male, the latter grows up, becomes sexually mature, and discharges its seminal fluid into the water, by means of which it is carried to the eggs within the bodies of younger chains.

December 1st. Mr. S. H. Scudder gave an account of the geographical distribution of *Vanessa cardui* and *V. Atalanta*, two butterflies of wider range than any others known. He attempted to show by the facts at command, and by the distribution of the other species of the genus, that *V. cardui* originated in North America and *V. Atalanta* in Europe. Both the species are now found over either hemisphere, and *V. cardui* over nearly the entire globe. The communication will be given in full in a future number of the Naturalist.

Professor James D. Dana made a communication on metamorphism and pseudo-morphism in minerals, in reply to Dr. Hunt's strictures on the author's views regarding these phenomena. A Prodome of the Tabanidæ of the United States. Part II. The Genus Tabanus, by C. R. Osten Sacken, was read by title.

Natural History Society at Michigan Agricultural College. Notes of Remarks made at late Meetings. — Two roots of the asparagus were found of equal size, about one eighth of an inch in diameter, of which one had grown right through the centre of the other, or the one had grown about the other. They were not fastened to each other, *i. e.*, one was loose in the cavity where it had grown. Roots of basswood and beech were found grown firmly together like a net-work, united in many places. Some of these were over an inch in diameter.

The leaf-cutting bee is very common about Lansing, Mich. It is quite destructive to leaves and petals of roses, the petals of *Petunia*, *Pelargonium*, and many others. The beauty of some beds of flowers is often much injured by them. Their cells are frequently found made of bits of leaves and petals. Quite a number were found in a woolen stock-

ing, where they were placed during a few days. In one case there were twenty-seven pieces of leaves to make a cell, and thirteen round pieces at the ends.

A plant of *Portulaca olerarca* (common purslane) weighed one pound and thirteen ounces, and by careful estimate produced about 1,250,000 seeds.

A student brought in a horn about six inches long, and over two inches in diameter, slightly curved and blunt at the apex. The horn was suspended on the abdomen of a sheep, a little to one side. It could be easily slipped around. It was there a year or so before the sheep was killed.

A student had noticed that the dandelion opened and closed four times before the flowers were withered and seed began to appear. On fair days it closed earlier than on cloudy, varying from noon till four o'clock.

Buffalo Society of Natural Sciences. — November 5, 1875. The following paper was read: A List of the North American Syrphidæ, by C. R. Osten Sacken. Mr. Grote announced that his Check List of North American Noctuidæ was in the printer's hands, and would be issued by Reinecke and Zesch, 500 Main Street, Buffalo, during the present month. Mr. Grote exhibited a specimen of a new species of *Trigonophora* for which the name *Trigonophora V-brunneum* was proposed. It was synonymous with the var. A. of *periculosa* Guen.

December 3d. Dr. Rohlff, the African traveler, was the guest of the evening. The following paper was read: An Illustration of North American Agrotis, by Dr. Leon F. Harvey.

Cambridge Entomological Club. — November 12, 1875. Dr. Hagen exhibited queens of white ants (*Termes flavipes*) found by Mr. H. G. Hubbard in Florida. No queens of this species have ever been found before in this country, and but one anywhere. The females are undeveloped, being wingless, but sexually mature. Dr. Hagen dwelt upon the extreme importance of a popular knowledge of the danger to which all wooden buildings are subjected by the presence of these insects, which occur not uncommonly over the country.

Mr. S. H. Scudder spoke of the supposed relation of the "osmateria" of certain butterflies (*Equites*) with the transverse fissure and prehensile organ of the underside of the prothorax in other butterflies.

National Academy of Sciences. — Meeting held at Philadelphia, November 3d and 4th. Professor Pumpelly read a paper on the influence of marine life and currents in the formation of metalliferous deposits. As an instance of the presence of the heavy metals in marine animals, he remarked that Bischoff extracted an appreciable amount of silver from only $1\frac{1}{4}$ pounds of *Pocillopora alcicornis*, one of the commonest reef-building corals. Professor R. E. Rogers accounted for the action of the steam geysers of California by chemical processes at the surface. The heat is caused by the action of air and water upon iron pyrites,

generating oxide of iron and sulphuric acid, which readily form sulphate of iron.

Natural History Society of Montreal. — November. A paper by Mr. H. G. Vennor, on the galena and plumbago deposits of Eastern Ontario, was read. Mr. Vennor believes that all the so-called Laurentian rocks which contain Eozoön and many metalliferous deposits (galena, apatite, etc.) are of Silurian or Cambrian age. These rocks are always associated with crystalline limestones. The Huronian group he believes to be next oldest, and lastly there is a great tract of Azoic gneisses, etc., which are truly Laurentian. The true Azoic Laurentian beds, in this view, do not contain metalliferous deposits, nor crystalline limestones.

SCIENTIFIC SERIALS.[1]

Proceedings of the Royal Geographical Society, xix. 7. — Summary of recent Observations on Ocean Temperature, made in the Challenger and Tuscarora, in relation to the Doctrine of a general Oceanic Circulation sustained by Difference of Temperature.

Petermann's Mittheilungen, xxi. 10. — The Russian Amu-Darja Expedition. A Natural History Journey to Patagonia, by Dr. K. Berg. Chinese Travelers of the Middle Ages to West Asia, by Dr. E. Bretschneider. Journey to Araguaya by Dr. Couto de Magalhaes in January, 1865. Notes on the Oasis El-Chargeh, by Dr. Schweinfurth. C. Weyprecht's Survey of the Northern Coast of Nowaja Semlja in September and October, 1872. October 18. Paul Solcillet's and Largean's Travels in the Sahara and to Soudan, by Gerhard Rohlfs. Pictures from the Far North, by Karl Weyprecht. The latest Travels in Australia, by E. Behm. The Spread of the Egyptian Power in the Upper Nile and its Geographical Results. Supplementary number, 34. Journey through North Africa from Kuka to Lagos, by G. Rohlfs. 35. The Population of the Earth, by Behm and Wagner. 36. Four Addresses on the Caucasus, by G. Radde. 37. Carl Mauch's Journey in the Interior of South Africa, 1865–72.

The Geographical Magazine. — November, 1875. The Arctic Expedition, iii., iv. A Glance at the Results of the Expedition to Hassar by H. P. Lerch, by H. Yule. The Voyage of the Challenger, by J. E. Davis. Recent Journeys in Paraguay, by Keith Johnston.

Bulletin de la Société de Géographie. — September, 1875. Rise and Fall of the Coast of France, by Jules Girard (records the discovery, between Vannes and Nantes, of Druidical monuments, under the water). Geography of the Athabaskaw-Mackenzie, by l'Abbé Petitot.

[1] The articles enumerated under this head will be for the most part selected, so that the entire contents of the journals are rarely given.

American Journal of Science and Arts. — December. On Southern New England during the Melting of the Great Glaciers, by James D. Dana. Notice of new and interesting Coal Plants, by E. B. Andrews.

Archiv für mikroskopische Anatomie. — October. The Genus Loxosoma, by Oscar Schmidt. On some Rhizopoda and allied Organisms, by L. Cienkowski. The Locomotive Apparatus of Infusoria, by H. Simroth. On a new Microtome, by P. Schiefferdecker. The Organs of Hearing of the Heteropoda, by C. Claus.

Nature. — October 28. Notes from the Challenger (describing a colossal hydroid Polyp), by G. J. Allman. November 4. American Geological Surveys, by A. Geikie. Müller on Bees and Flowers, by J. Lubbock. November 11. Evidences of Ancient Glaciers in Central France, by J. D. Hooker.

Jena Journal of Science (Jenaische Zeitschrift, etc.). — May. The Ontogeny of Fresh-Water Pulmonates, by Carl Rabl. Contribution to the Knowledge of Termites, by F. Müller. *Hæckelina gigantea*, a Protist of the Group of Monothalamia, by E. Bessels. July. On the Developmental History of Helix, by H. von Jhering. The *Gastrula* and the Segmentation of the Eggs of Animals, by E. Haeckel.

Archiv für Anthropologie. — August. Notes on the Innuit of Smith's Sound, etc., by E. Bessels. Traces of Men in the Interglacial Deposits of Switzerland, by L. Rütimeyer.

Journal of Zoölogy (Siebold and Kölliker, editors). — July. New Contributions to a Knowledge of Parasitic Copepods, by C. Claus. On the Results of Studies on the Conjugation of Infusoria and Cell Division, by O. Bütschli. Egg-Segmentation and Larval Development of Phascolosoma, by E. Selenka. On the Structure and Budding of Loxosoma, by H. Nitsche.

Annals and Magazine of Natural History. — London, December. Relation of the Canal-System to the Tubulation in the Foraminifera, with reference to Dr. Dawson's Dawn of Life, by H. J. Carter. Contributions to the Study of the Chief Generic Types of the Palæozoic Corals. By James Thompson and H. A. Nicholson.

Annales des Sciences naturelles. — Paris, October, 1875. Study of the Annelides of the Gulf of Marseilles, by A. F. Marion and N. Bobretzky.

The Geological Magazine. — London, December, 1875. The Cause of the Glacial Period in Britain, by Charles Ricketts. Did the Cold of the Glacial Epoch extend over the S. Hemisphere? by F. W. Hutton. A Chapter in the History of Meteorites (part xii.): The Conclusion, by W. Flight.